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ABSTRACT

STEP-BY-STEP PROCEDURES ARE GIVEN FOR THE DEVELOPMENT OF CONSTRUCTION PLANS, INCLUDING: INSTRUCTIONS FOR THE INITIAL SITE SURVEY AND REPORT, SCHEMATIC DRAWINGS, PRELIMINARY DRAWINGS, WORKING DRAWINGS, THE CONSTRUCTION PERIOD, AND THE USE OF THE RECOMMENDED SPECIFICATION FORM. CONSTRUCTION STANDARDS ARE SPECIFIED FOR NUMEROUS BUILDING CONSTITUENTS SUCH AS SPRINKLER SYSTEMS, TELEPHONES, STAIRWAYS, CUSTODIAL ROOMS, ENTRANCE WAYS, AND ELEVATORS. (FS)

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INSTRUCTIONS
TO
ARCHITECTS AND ENGINEERS

Prepared by

Department of Physical Plant

Brigham Young University

Sam F. Brewster
Director

January 1959

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February 1961
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INTRODUCTION

RECOMMENDED STANDARDS OF CONSTRUCTION

SECTION 1. GENERAL INFORMATION

1. The following 28 Divisions are prepared to assist Architects and Engineers in the planning of all future buildings on the Brigham Young University Campus. These instructions should be followed carefully.

2. Where the same problem is treated in both these instructions and in the Program Requirements, the Architect and Engineer shall go by the Program Requirements.

DIVISION 1

Brigham Young University

INSTRUCTIONS
TO
ARCHITECTS AND ENGINEERS

Subject — Section

INITIAL SITE SURVEY AND REPORT 1

SCHEMATIC DRAWINGS 2

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WORKING DRAWINGS 4

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    DRAWING TITLE SHEET

    ARCHITECT'S REQUEST FOR PAYMENT

    ARCHITECT'S INSPECTION REPORT

DIVISION 1

INSTRUCTIONS TO ARCHITECTS AND ENGINEERS

SECTION 1. INITIAL SITE SURVEY AND REPORT (Phase 1)

After receiving the Owner's Program Requirements, the Architect shall proceed with the following:

1. Visit the site with the Owner's designated representative (unless released from this requirement by written instructions) in order to become familiar with all governing site conditions.

2. Obtain an accurate site survey (unless this has been previously obtained by the Owner) giving grades, contours, property lines, streets, pavements, easements, and restrictions, and full information as to sewer, water, electric, and gas service lines. The cost of the site survey shall be paid by the Owner in addition to the Architect's regular fee.

3. Determine need for soil bearing studies. If found advisable, obtain all essential data on the subsoil by borings, or test pits, and chemical, mechanical, or other necessary tests. The cost of the site survey shall be paid by the Owner in addition to the Architect's regular fee.

4. Furnish soil and landscaping data.

5. Submit a written report to the Owner incorporating the data and findings enumerated in the foregoing subsections, with a written declaration as to the suitability of the site and the Architect's ability to formulate a plan within the Owner's Program Requirements.

6. After receipt of the above information, instructions will be given the Architect relative to any needed special engineering studies and concerning the preparation of schematic drawings.

SECTION 2. SCHEMATIC DRAWINGS (Phase 2)

1. The Architect shall prepare and submit schematic drawings in accordance with the Owner's Program Requirements. During this preparation, the Architect is encouraged to make several studies of the problem in an effort to arrive at the most functional solution. Frequent consultation with the University during this important phase of the work is essential.

2. Drawings may be single line, if desired. Elevations and perspectives at this stage are not required, but the Architect is encouraged to make a sufficient study of the arrangements of building masses to depict the general architectural concept of the project.

3. It is recommended that drawings be prepared on sheets which, when trimmed, are multiples of standard letter size (8-1/2" x 11") for easy folding and mailing.

4. Include on the main floor plan a tabulation of space areas shown on the schematics as compared with those shown by the Owner's Program Requirements.

5. Every sheet shall be titled with project name, Architect's name, sheet number, and date submitted.

6. Furnish five copies of the schematics to the University, accompanied by a letter of transmittal. The Architect will be advised in writing as to the required revisions or official approval. Until this written approval is received, the Architect is not authorized to proceed with the preparation of preliminary drawings.

SECTION 3. PRELIMINARY DRAWINGS (Phase 3)

1. Prepare floor plans, elevations and sections, and a perspective as a further development, or the approved schematics in sufficient detail to clearly show the nature, size, and architectural concept of the project.

2, Prepare an outline specification in which the general type of material and equipment for each trade classification is shown.

3. Prepare a cost estimate and include as last page in the outline specifications.

4. The plot is to include the site data described under Phase 1, contours, and preliminary layout of walks, drives, auto parking and planted areas. This will be given to Landscape Architects for their study and recommendations. These studies and recommendations will be furnished to the Architect at the time preliminaries are approved, or shortly thereafter so that they may be incorporated into the working drawings.

5. It is recommended that all drawings be prepared on sheets, which, when trimmed, are multiples of standard letter size (8-1/2 x 11) for easy folding and mailing.

6. Include on main floor plans a tabulation of space areas shown on the preliminaries as compared with those on the approved schematics.

7. Every sheet shall be titled with project name, Architect's name, sheet number, and date submitted.

8. Furnish one framed perspective without glass, give bound copies of the outline specifications, and five copies of all drawings (poche one set of floor plans). These should be accompanied by a letter of transmittal. Architect will be advised in writing of required revisions or approval.

GENERAL NOTE: Schematic plans, preliminary plans, and working drawings will be approved by the University and by the Church Building Committee. Preliminary drawings, however, must also be approved by the Committee on Expenditures. The presentation of the floor plan arrangements and a perspective affords the Committee with the one opportunity to evaluate and approve the functional and architectural concepts of the project.

The specific method of rendition is left to the choice of the Architect, but it should be suitable for easy viewing at a distance of at least 20 feet. When illustrating projects which include additions to existing structures, a different colored poche should be used for each section.

9. First Stage Payment of Architect's fee is payable after Owner's written approval of preliminary drawings. Request for this payment should be submitted in triplicate on printed forms furnished by the Owner.

SECTION 4. WORKING DRAWINGS (Phase 4)

1. Prepare working drawings and specifications in harmony with approved preliminaries.

2. Working drawings shall include a Title Sheet for approval signatures. See example in this Division. Specifications shall include a Title Page. See example in this Division. Plans and specifications cannot be issued to bidders until both Drawing Title Sheet and Specification Title Sheet are complete with signatures.

3. Incorporate into working drawings, but on separate sheets, site development, planting recommendations as furnished by the Owner, and grading plans, complete with proposed ground changes, drainage structures, retaining wall details, etc. If the Architect has any question regarding these instructions, confer with the University for clarification.

4. Design the High Temperature Water System in accordance with Division 4, High Temperature Water Distribution.

5. Design structural features in accordance with the Uniform Building Code of the Pacific Coast Conference, latest Edition.

6. The electrical design shall conform to the requirements of the National Electric Code.

7. It is recommended that drawings be made on sheets which, when trimmed, are multiples of standard letter size (8-1/2" x 11").

8. Every sheet shall be titled with project name, Architect's name, sheet number, and date submitted.

9. Specifications should be so written that each trade classification may be bid separately and that open competitive bidding may be had on all items. Do not type two major trade classifications on any one sheet. Any one trade classification may be left out for subcontract proposals. (See Division 2 on Instructions to Bidders, Form of Proposal, Performance Bond, Labor and Material Payment Bond, Form of Contract, General Conditions, and General Scope of Work).

10. Carefully check coordination of structural, mechanical, and electrical features shown on plan. This applies particularly to locations of air outlets, ducts, electrical outlets, and structural ceiling members. A complete plan showing relative location of these will prove helpful.

11. When drawings and specifications are completed, submit five sets to the University for checking purposes. These should be accompanied by a letter of transmittal. Marked check set will be returned to Architect for any necessary revisions.

12. Return to the University, after revision, the marked check set for final review.

13. Second Stage Payments of the Architect's fee are made in accordance with the provisions of the Architect's Agreement. Requests for these payments should be submitted in triplicate on printed forms furnished by the Owner.

SECTION 5. CONSTRUCTION PERIOD (Phase 5)

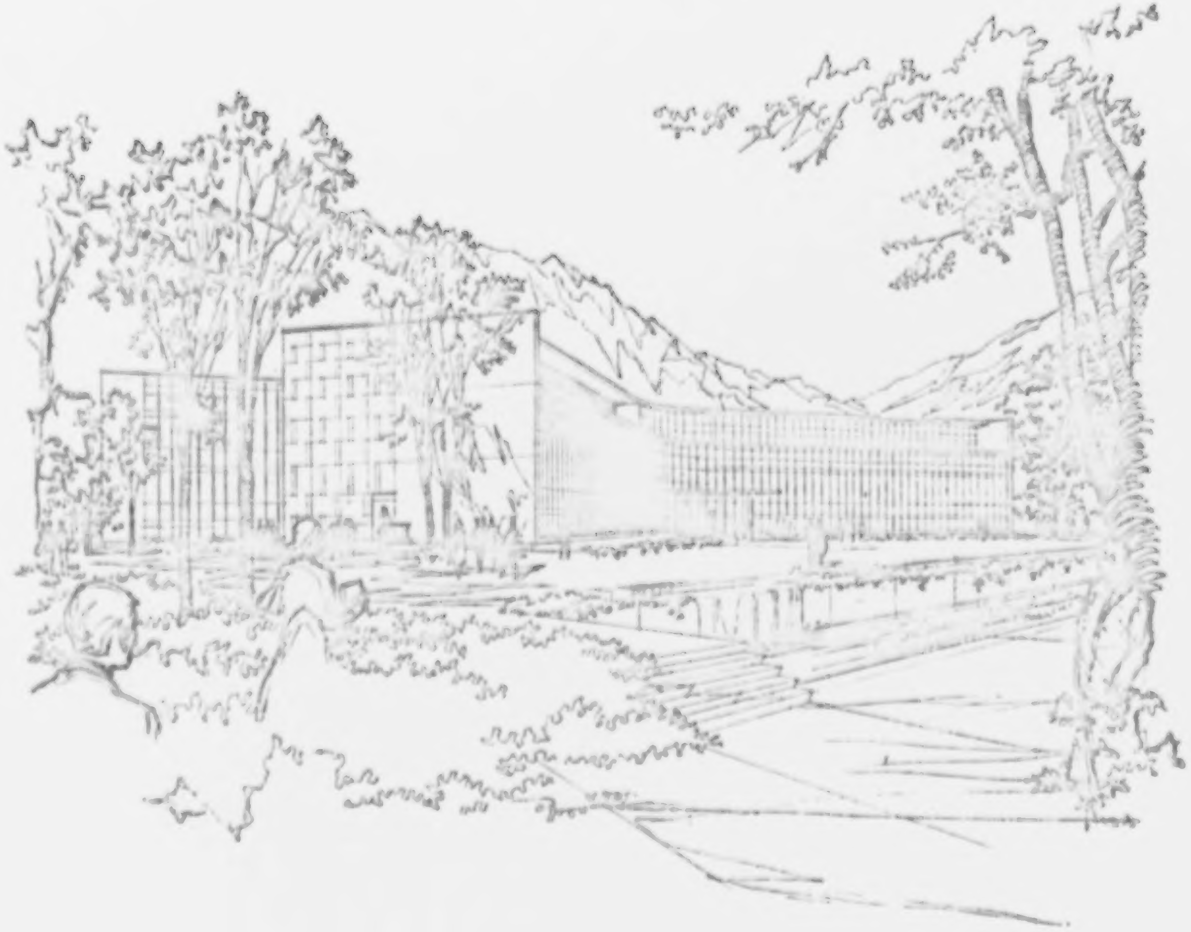
1. If Architect's Agreement includes "Regular Supervision," make sure that all conditions stipulated are fully performed. Note particularly that "as-built" drawings are required. This will require careful notations during early stage of construction while trench excavations for service lines are open.

2. The Architect shall coordinate his services with the Representative of the University who is in charge of construction.

3. Before requesting final Third Stage Payment, re-read the Architect's Agreement. Have all conditions been complied with? "Completion Certificate," "As-built drawings," and "Owner's copy of working drawings."

4. Requests for Third Stage Payments, including final payment, shall be submitted in triplicate on printed forms furnished by the Owner.

Best available copy



BRIGHAM YOUNG UNIVERSITY

ADMINISTRATION & GENERAL SERVICES BUILDING

ARCHITECT'S INSPECTION REPORT

Sam F. Brewster, Director
Department of Physical Plant
Brigham Young University
Provo, Utah 84601

Re: Inspection Trip No. ______________
for Project ______________
____

Dear Mr. Brewster:

Following is a report of Inspection Trip No. ______________, made on ______________ (date), for the (project name) ______________.

WEATHER CONDITIONS: ______________

MET WITH: ______________

____

Present Status of Work and Remarks:

____

____

____

____

____

____

____

____

Submitted by

ARCHITECT'S NAME

By ______________

DIVISION 2

RECOMMENDED

SPECIFICATION FORM

GENERAL INFORMATION

TYPICAL TITLE PAGE

TYPICAL INDEX

TYPICAL DETAIL SPECIFICATION

OUTLINE OF INSTRUCTIONS TO BIDDERS

OUTLINE OF FORM OF PROPOSAL

OUTLINE OF SUPPLEMENTAL GENERAL CONDITIONS

MAP OF CAMPUS

PERFORMANCE BOND

LABOR AND MATERIAL PAYMENT BOND

CONTRACT FOR CONSTRUCTION

GENERAL CONDITIONS

PROGRESS ESTIMATE

Recommended Specification Form

GENERAL INFORMATION

1. It is the policy of the University to have OPEN specifications. The title of University method of specifications is called "Base Bid with the Contractor's Multiple Choice." This means that wherever possible, the Contractor is given three or more materials or methods upon which to bid. Any of these would be acceptable to the University. However, the Contractor MUST base his bid on one of the specified materials or methods. The specified material or method must be clearly stated (including all technical data, description, manufacturers' names, catalog numbers, etc.) so that a Contractor will have a complete understanding as to what he is required to do. The "or equal" phrase SHALL NOT be used, as this is a constant source of contention.

2. Read Section 58 of the General Conditions for information on "substitutions" as related to the specifying of materials.

3. Due to the numerous building projects that are under construction on the Brigham Young University Campus, it is recommended that specifications be standardized in form to further expedite supervision and inspection. It is requested that different colors of paper be used for the major divisions: blue for mechanical, yellow for the electrical, etc.

4. The following 11 pages are example pages of a specification which you are requested to follow. The first page is an example title page. (Signatures to be affixed before binding.) The second, third, and fourth are examples of an index; the fifth through eleventh are examples of a typical detail specification. Following these examples are "Instructions to Bidders," "Form of Proposal," and "Supplemental General Conditions" in outline form. The Architect is to fill in these spaces with the data pertinent to a specific project. Included in this compilation are copies of a map of the campus, Performance Bond, Labor and Materials Payment Bond, Contract for Construction, General Conditions, and Progress Estimate. These five items are available in sufficient number from the Physical Plant Department of the Brigham Young University to have bound in the specifications. They are included here for your information only.

5. The Architect shall circle the building in red on the campus map where the bid opening will take place. This is merely to inform the Contractor as to the location of the bid opening.

(Typical Title Page)

SPECIFICATIONS

FOR

ALTERATIONS AND ADDITIONS TO CLUFF PLANT SCIENCE LABORATORY

BRIGHAM YOUNG UNIVERSITY
PROVO, UTAH

APPROVED

(Signature to be affixed before binding)
Dean - Biological and Agricultural Sciences

Date

(Signature to be affixed before binding)
Director - Department of Physical Plant

Date

(Signature to be affixed before binding)
President - Brigham Young University

Date

(Signature to be affixed before binding)
Chairman - Church Building Committee

Date

PROJECT NUMBER

735-30-825

Lewis Eric Sandstrom, Jr.
ARCHITECT
81 East Center
Provo, Utah

(Typical Index)

GENERAL INDEX

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	Title Page	
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PB	Performance Bond	1 - 2
LMB	Labor & Material Payment Bond	1 - 3
C	Contract	1 - 4
GC	General Conditions	1 - 32
SGC	Supplementary General Conditions	1 - 1
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NOTE: The Table of Contents shows only a portion of the Sections required under each Division. The Architect and Engineer should add or subtract from these sections as required for their particular project. However, the sections under each Division should follow as closely as practical the Uniform System for Construction Specifications, Data Filing, & Cost Accounting as prepared by:

American Institute of Architects
Associated General Contractors of America, Incorporated
The Construction Specifications Institute, Incorporated
The Council of Mechanical Specialty Contracting Industries, Incorporated.

DIVISION 6 --- CARPENTRY

---

1. GENERAL CONDITIONS

The General and Supplementary General Conditions are a part of this Division.

SECTION 6A - ROUGH CARPENTRY

06A-01. SCOPE OF WORK

1. Work Included: This work consists of, but is not limited to, the furnishing of all plant, labor, equipment, appliances, and materials in performing all operations in connection with the installation of rough carpentry, complete in strict accordance with the specifications and the drawings.

   a. All rough carpentry, including nailing blocks, strips, grounds, wood furring, wood studs, wood bucks, etc.

   b. Provide and install all wood to be connected to steel, iron, concrete and masonry.

   c. Installation of hollow metal doors and frames furnished under Division 8.

   d. This Contractor will consult and cooperate with trades whose work proceeds and follows the work of this Division to insure an orderly and expeditious procedure in the execution of all carpentry work.

   e. Constructional hardware such as nails, screws, bolts, etc., shall be furnished, unless specifically called for in the other Divisions of this specification.

   f. The work incidental to laying out and the general progress of the structure, including batter boards, temporary barricades for protection of work, workmen, and the public.

2. Work Not Included:

   a. Furnishing metal frames for wood doors, see Division 8.

   b. Furnishing finish hardware, see Division 8.

   c. Concrete form work, see Division 3.

06A-02. MATERIALS

1. Grading: All lumber shall conform to the Standard Grading and Dressing Rules for "West Coast Lumber," No. 15, as published by "West Coast Lumberman's Association."

2. Seasoning: All lumber air-dried and well seasoned unless otherwise noted. All exposed wood finish material thoroughly air seasoned and kiln-dried to 10% moisture content and allowed to slowly assume normal moisture content of the job location prior to installation.

3. Pressure Treating: All wood bearing directly on concrete, pressure treated with Wolman Salts or Chromated Zinc Chloride in accordance with "Wood Preservers' Association Standard Specifications."

4. Framing and Load Bearing Lumber: "Construction" grade Douglas Fir, S4S. Furring, blocking and nailing strips, "Standard and Better" grade Douglas Fir, S4S.

5. Building Paper: Sisalkraft.

6. Plywood: Each panel of softwood plywood shall be identified with the DFPA grade-trademark of the American Plywood Association, and shall meet the requirements of the latest edition of the U. S. Product Standards PS 1-66 for Softwood Plywood. All plywood which has any edge or surface permanently exposed to the weather shall be exterior type. Application shall be in accordance with recommendations of the American Plywood Association.

   a. Interior: Douglas Fir, A-A Interior DFPA or standard manufacture. Good one or two sides, as required.

   b. Exterior: Douglas Fir, A-C Exterior DFPA.

7. Glue: Best grade suited for purpose.

06A-03. PROTECTION AND STORAGE

1. Protection: All lumber shall be protected and kept undercover, both in transit and at the jobsite during inclement weather. Lumber showing warping or other damage due to weather exposure must be replaced. Material shall not be delivered unduly long before it is required for the proper conduct of the work.

2. Storage: Lumber shall not be stored within any room of the structure that is being plastered; nor until plaster and masonry work is reasonably dry.

06A-04. WORKMANSHIP AND INSTALLATION: ROUGH CARPENTRY

1. Grounds shall be brought to exact finish of plaster and to the back of other materials and secured firmly by approved means. Grounds shall be true to line, spaced accurately, plumb, straight, even and true to dimensions.

2. Furnish and install and remove temporary wood grounds whenever required for plastering, wainscoting, base, and the like.

3. Set temporary wood grounds in all openings not having casing and around all vent and duct openings and whenever necessary for plaster and other materials, whether specifically mentioned or not.

4. Furnish and set proper wood grounds for all wood trim as required.

5. Use grounds 3/4" thick on metal lath and 1/2" thick on masonry walls and partitions.

6. Nailing strips, ridges, cant strips, etc., shall be furnished and placed on roof decks by this Division. Wood shall be treated with wood preservative as noted. Provide facia as indicated at the edge of all roof decks.

7. Nailing blocks as may be required shall be furnished and installed under this Division.

06A-05. ANCHORS

1. Install anchors where required to anchor carpentry to masonry, steel or concrete.

06A-06. FRAMING

1. Set accurately to required lines and levels; secure rigidly in place. Where required, timber connections and installation according to National Design Specifications for stress grade lumber and its fastenings. Size studs to give true surface for finish. Frame members for passage of pipes and ducts to avoid cutting structural members. Do not cut, notch, or bore framing members for passage of pipes on conduits without permission. Reinforce framing members damaged by cutting as directed. Provide special framing construction, not indicated or specified, as required to complete job in best workmanlike manner. Keep framing 2" away from chimneys and stacks. Nail and spike thoroughly using nails and spikes of ample size. Space and anchor structural framing members as indicated on drawings.

2. Provide fire stopping and x-bridging in accordance with the "Uniform Building Code."

06A-07. The Carpentry Contractor shall periodically remove all debris resulting from his work and upon completion, shall leave the work thoroughly clean, neat, and undamaged.

SECTION 6B - - FINISH CARPENTRY

06B-01. SCOPE OF WORK

1. Work Included: This work consists of, but is not limited to, the furnishing of all plant, labor, equipment, appliances, and materials in performing all operations in connection with the finished carpentry and millwork, complete in strict accordance with the Specifications and Drawings.

   a. All work shall be done in a mill of established reputation having the approval of the Architect.

   b. Millwork shall be delivered to the jobsite in a manner that no damage will be sustained thereto. Case and cabinetwork shall be assembled at the shop and delivered to the building in as large sections as will permit shipping to an installation in the building. No millwork is to be stored in damp areas or in finished areas until plaster is dried. Any damage to millwork caused by improper delivery or unsafe storage conditions on the site shall be made good by the Millwork Contractor.

   c. All wood doors in accordance with the drawings and specifications and installation of door grilles.

   d. All wood casework and cabinets as shown on the drawings, including the placement of finished hardware thereon.

   e. Shelving in Janitor Room.

   f. The installation of all millwork.

2. Work Not Included : All cabinets shown in dash line and designated NIC shall be furnished and installed by the Owner. Catalog numbers shown are for reference purposes only.

06B-02. SHOP DRAWINGS

1. The Contractor shall furnish shop drawings for all casework and cabinets required in the execution of his work. Shop drawings shall be submitted to the Architect for approval in accordance with the General Conditions.

06B-03. MATERIALS

1. All millwork stock shall be thoroughly seasoned, sound, and free from imperfections and kiln-dried to a uniform moisture content suitable to the position in which the materials are to be used and in accordance with the specific requirements noted under the various materials.

2. Exposed Finish Wood:

   a. All oak is to be select grade, plain sawed, southern red oak, and at time of fabrication shall have an average moisture content of 10% or less.

   b. Pine shall be select grade, "B" or better, White Ponderosa pine, thoroughly kiln-dried and having an average moisture content of 10% by weight.

3. Lumber: All lumber used for structural purposes and material in concealed portions of the millwork is to be kiln-dried "D" select White Ponderosa Pine or kiln-dried construction and better common Douglas Fir.

4. Plywood: Shall be of U. S. Plywood Corporation or Weyerhauser Company or Georgia-Pacific.

   a. All oak plywood shall be A2 grade rotary cut, red oak, of the thickness and ply called for in the drawings.

   b. Fir plywood shall be AD interior type of the thickness and ply required by the drawings.

5. All glue shall be waterproof Phenol Urea Resin, or Casein, conforming to Federal Specification MMM-A-188 or MMM-A-125.

6. Laminated Plastic: Surfaces indicated on the drawings shall be fabricated using 1/16" thick laminated plastic "Formica", "Consoweld", "Panelyte", "Wilson Art", "Micarta", or "Textolite". Color and pattern shall be selected by the Architect.

   a. Laminated plastic for all laboratory cabinets shall be black "Formica" only, unless otherwise noted.

7. Hardboard shall be tempered type, as manufactured by Masonite Corporation. Thickness as shown on the drawings.

06B-04. ASSEMBLY AND WORKMANSHIP

1. All millwork shall be manufactured in accordance with Standards as established in the "Manual of Millwork" of the Woodwork Institute of California. A copy of this manual is on file at the Architect's Office and copies may be obtained by writing to: Woodwork Institute of California, 1833 Broadway, P. O. Box 1666, Fresno, California, 93717.

2. All millwork shall be planed, cut, rabbeted, grooved, fitted, etc., as necessary for proper assembly and accurate working to details. Built-up members shall be glued, splined, doweled, tongue and grooved, full or

half-housed, or rabbeted together as detailed or as necessary for firm and sound construction. Should nails or screws be required in the assembly process, they are to be concealed.

3. Millwork shall be delivered to the job mill assembled, unless otherwise directed. Units shall have temporary spreaders and diagonal braces to maintain them square and true.

4. All surfaces of millwork which are to receive painter's finish are to be mill sanded on all exposed surfaces to a smooth even plane. Care shall be exercised in assemblying pieces where the grain is perpendicular in various places, one to another, and in panels to avoid cross sanding.

5. All surfaces which are to be placed directly or indirectly in contact with masonry or other wall surfaces shall be back primed at the mill before delivery to the building.

6. The Contractor shall fabricate all work in accordance with measurements taken at the job conforming it to job conditions. Where scribing or cutting appears necessary, the materials shall be made in ample size to allow for job adjustments.

06B-06. TRIM

1. All trim members shall be true to details, cleanly cut and sharp. Scribing, mitering, and joining shall be done accurately and neatly to conform to the details and as required. Intersecting molds at re-entrant corners shall be neatly coped rather than mitered where such is possible. All trim wider than 3" shall be routed on the back surface. Shop joints shall be made under pressure with waterproof or hot glue.

2. Material for trim shall be oak, conforming to woodwork in the specific area and in accordance with the details on the drawings.

06B-06. DOORS

1. All wood doors shall be furnished as a part of the millwork. Size, type, finish, etc., for all such doors are given in the Door Schedule. All wood doors shall be fabricated and assembled in accordance with the standards of the National Door Manufacturers' Association, Incorporated. The finish doors shall be sanded smooth, have tight joints and sharp clean cut moldings.

   Faces shall be free from defects or machine marks which will show through the finish. All doors must be guaranteed against warpage, twisting, or winding with the one year guarantee period. Doors showing a warp greater than 1/8" shall be replaced.

2. Interior doors are to be furnished as called for in the Door Schedule.

   a. 1-3/4" solid core, wood staved, five ply "Roddis" standard by Weyerhauser Company, or Mengel-made, stabilized, "Weldwood" by U. S. Plywood Corporation, with rotary cut red oak. Provide with an edging member of the same material as the face. This member shall extend the full thickness of the core and shall be at least 3/4" thickness from edge of door.

3. Provide glass stops as required. Glass stops shall be of the same material as doors. Glazing for all doors is specified under "Glass and Glazing", Division 8.

4. All doors shall be fitted and hung in a first-class manner. All hardware will be furnished under "Finish Hardware", Division 10, but installed under this Division.

06B-07. SHELVING

1. Miscellaneous shelving not constructed as a part of cabinets and casework shall be furnished complete as a part of the work of this Section as follows:

   a. Full oak plywood and oak facing.

   b. Oak edged 3/4" fir plywood in Janitors' Room and other areas as indicated on the drawings.

06B-08. CABINETS AND CASEWORK

1. Wood finish, millwork, and cabinetwork shall be manufactured by skilled mechanics using standard methods of manufacturing and workmanship. Cabinets and casework shall be "Custom" grade, flush type construction, in accordance with "Manual of Millwork", of the Woodwork Institute of California. Refer to 06B-04., this Section.

   a. Unless otherwise noted on the drawings, all cabinets and cases shall be constructed of materials specified under Section 6B, 06B-03. All exposed surfaces, interior and exterior, shall be oak veneer. Other surfaces shall be "B" and better, vertical grain, soft old growth fir.

   b. Plywood shelving with oak edging shall be A-B Fir Plywood, with 1" wide nosing of Red Oak as specified.

   c. Adjustable shelf standards and brackets shall be as specified on the drawings. "Knape and Vogt" or equal.

(Typical Form)

INSTRUCTIONS TO BIDDERS

SECTION. 1. SECURING DOCUMENTS

1. Contract Documents (plans and specifications) may be obtained by general contractors from the Construction Section of the Physical Plant Department at Brigham Young University, Provo, Utah. A deposit of $____________, paid in advance, will be required on each complete set of documents taken, with a limit of three (3) sets. Cash deposit requirement is waived for members of the Utah Chapter of the Associated General Contractors. The construction work is to be bid in one general contract including general work, plumbing, heating, and ventilating, electric work, elevators, and exterior construction site work. Landscape planting and lawn sprinkler systems are not to be included.

2. All Contract Documents must be returned to the Construction Section of the Physical Plant Department at the Brigham Young University within seven (7) days after the bid opening, or the deposit will be forfeited. Those documents purchased outright by the bidders are exempted.

3. Contract Documents (plans and specifications) may be examined at no charge at the following places:

Construction Section
Department of Physical Plant
Brigham Young University
Provo, Utah

Associated General Contractors
1135 South West Temple
Salt Lake City, Utah

Architect's or Engineer's
Name and Address

Intermountain Contractors
436 West 900 South
Salt Lake City, Utah

Sheet Metal Contractors
2150 South 2nd West - Suite 1B
Salt Lake City, Utah

4. Subcontract bidders and material suppliers who desire to obtain Contract Documents (plans and specifications), or parts thereof, for exclusive use, may do so by requesting same in writing and paying costs of printing to the Engineer/Architect (strike the non-applicable title).

SECTION 2. PROPOSALS

1. Proposals to receive consideration shall be made in accordance with the following instructions:

   a. Proposals shall be made upon a separate form, which is a duplicate of the Form of Proposal bound in the specifications, properly and with all items and/or blanks filled in. Numbers shall be stated both in writing and in figures. The signature of all persons signing shall be in longhand. The completed Form of Proposal shall be without interlineations, alterations, or erasures. If the above requirements are not satisfied, then the proposal may be disqualified at the discretion of the Owner.

b. Proposals shall not contain any recapitulation of the work to be done. Alternative proposals will not be considered, unless called for. No oral, telegraphic or telephonic proposals or modifications will be considered. If the above requirements are not satisfied, then the proposal may be disqualified at the discretion of the Owner.

c. If the proposal is submitted as a "Joint Venture" of two or more bidders, all members of the "Joint Venture" shall sign the proposal and the official representative of the "Joint Venture" shall be named in the proposal.

d. Before submitting a proposal, bidders shall carefully examine the drawings, read the specifications, and shall visit the site of the work, and shall fully inform themselves as to all existing conditions and limitations, and shall include in their bids a sum to cover the cost of all items included in the Contract Documents.

SECTION 3. WITHDRAWAL OF PROPOSAL

1. Proposals may be withdrawn by the bidder, either personally or by written request, prior to, but not after, the time fixed for opening the proposals. Proposals submitted and opened may not be withdrawn and must remain fixed and in force as submitted for a period of thirty (30) days after the date for the opening of proposals.

SECTION 4. SPECIAL PROPOSAL INSTRUCTIONS

1. Proposals enclosed in a sealed envelope bearing the title of the work and the name of the bidder will be received by the Brigham Young University, Provo, Utah, through the Director of the Department of Physical Plant, at

THE CANNON CENTER, LOCATED IN HELAMAN HALLS, BRIGHAM YOUNG UNIVERSITY, PROVO, UTAH, UNTIL ___________, M.S.T. ON _________________, _________________, AT WHICH TIME AND PLACE THEY WILL BE OPENED AND READ ALOUD. A MAP OF THE CAMPUS IS ENCLOSED WITH THE CANNON CENTER ENCIRCLED IN RED.

It is the sole responsibility of the bidder to see that his proposal is received in proper time. Any proposal received after the scheduled closing time for receipt of proposals shall be returned to the bidder unopened.

2. Contract Proposals:

a. BIDDERS SHALL ACCEPT PROPOSALS FROM ONLY THOSE SUBCONTRACTORS WHO HAVE DEMONSTRATED TO THE BIDDERS' SATISFACTION THAT THEY ARE FINANCIALLY CAPABLE OF HANDLING THE WORK, HAVE THE TECHNICAL ABILITY, PERSONNEL, PLANT, PAST EXPERIENCE, AND REPUTATION TO CARRY OUT THEIR PORTIONS OF THE WORK. IT WILL BE ASSUMED THAT THE QUESTION OF BONDING OF SUBCONTRACTORS WHERE CONSIDERED DESIRABLE AND/OR NECESSARY, AND THE COST OF SUCH BONDS HAS BEEN RESOLVED BEFORE PROPOSALS HAVE BEEN SUBMITTED TO THE OWNER.

b. In case a bidder has any doubt regarding the correctness or acceptability of any subcontract proposal, the bidder may submit the names and amounts of other competing subcontractors, making sure, however, that he clearly states which one he used in formulating his proposal.

c. EACH BIDDER SHALL INCLUDE, WITH HIS PROPOSAL, A LIST OF SUB-CONTRACTORS, (WHERE PROVIDED ON THE FORM OF PROPOSAL), TOGETHER WITH THE DOLLAR AMOUNTS OF THEIR BIDS WHICH WERE USED BY HIM IN FORMULATING HIS PROPOSAL. THIS LIST SHALL INCLUDE SUBCONTRACT BIDDERS TO THE MECHANICAL SUBCONTRACTORS. IF THE ABOVE REQUIREMENTS ARE NOT SATISFIED, THEN THE BID MAY BE DISQUALIFIED AT THE DISCRETION OF THE OWNER.

3. Opening and Considering of Proposals:

a. Immediately after the public bid opening, or as soon thereafter as is practicable, the Owner and the Architect will interview the apparent low bidder; and if deemed advisable, the second and third apparent low bidders.

b. The list of subcontractors, submitted by the bidder being interviewed, will be examined. The Owner reserves the right to accept or reject any of the subcontract proposals submitted. If the Owner rejects a subcontractor for any reason other than those stated in Section 4, Paragraph 2, sub-paragraph "a", then the Owner shall pay the difference, if any, between the subcontractor proposed and one mutually acceptable to the Owner and the bidder. If the Owner rejects a subcontractor for non-conformance to the conditions stated in Section 4, Paragraph 2, sub-paragraph "a", then the bidder shall pay the difference, if any, between the subcontractor proposed and one mutually acceptable to the Owner and the bidder.

c. The bidder's and the subcontractors' past performance, organization, equipment, and ability to perform and complete their contracts in the manner and within the time specified will be vital elements considered along with the cash amount of the proposal in letting the Contract.

d. The Owner further reserves the right to reject any or all proposals, or to waive any informality in proposals received. The Owner further reserves the right to accept the proposal of the bidder that will serve the best interests of the Owner, as determined by the Owner, whether or not the bidder's proposal accepted is the lowest proposal submitted.

e. The Contract between the Owner and the successful bidder cannot be signed for at least ten (10) days after the opening of the proposals.

SECTION 5. POLICY RELATIVE TO OPENING OF PROPOSALS

1. Proposals will be opened only in the presence of representatives of the Owner and the bidders, and the Owner reserves the right to release all publicity relating to the proposals and the project. All bidders are expected to keep confidential all matters pertaining thereto.

SECTION 6. REQUIREMENTS IMMEDIATELY AFTER SIGNING THE CONTRACT

1. Immediately after entering into a Contract with the Owner, the Contractor shall furnish the following:

   a. An executed performance bond, and an executed labor and materials payment bond, each in an amount equal to 100% of the contract sum as security for the faithful performance of the Contract and for the payment of all obligations arising thereunder. Each of these bonds is to conform to the sample form bound in these specifications. The surety company's proposal submitted by the Contractor shall be subject to the approval of the Owner. These bonds shall be paid for by the Contractor and their cost shall be included in the proposal price.

   b. Insurance certificates as called for in the General Conditions and/or Supplemental General Conditions.

   c. A cost breakdown of the total proposal into its various components of the work according to the specification headings, which may serve as a basis for making monthly payments to the Contractor.

   d. The Contractor shall let subcontracts as mutually agreed between the Owner and the Contractor. The Contractor shall submit to the Owner, within fifteen (15) calendar days after the Owner has approved all subcontractors a complete list of subcontractors and major material suppliers, including names, addresses, and telephone numbers.

SECTION 7. TIME OF COMPLETION

1. The Contractor agrees to complete the work required by the Contract on or before midnight, ______________________________.

2. Time is hereby expressly declared to be of the essence of the Contract.

3. It shall be further understood that the Contractor shall render his work ready for final inspection at least three full weeks ahead of the above stated date. This three-week period shall be used by the Owner for his final inspection, and in turn, by the Contractor, for his completion of all work requiring completion and/or remedy as called to his attention through said inspection by the Owner.

SECTION 8. LIQUIDATED DAMAGES

1. It is recognized and agreed by the parties hereto that it is of importance to the Owner to have this project completed within the time schedule hereinabove agreed upon; that the owner will be materially damaged if the project is not completed in compliance therewith; and that the exact nature and amount of the damage which will result from any delay in the completion thereof within the time specified are uncertain and difficult, if not impossible, to ascertain. Therefore, if said time schedule is not adhered to by the Contractor, plus any additional time which may be allowed by written extension signed by the Owner's authorized agent, hereinafter referred to, the Contractor shall pay to the Owner as fixed, agreed and liquidated damages (and not as a penalty) the following:

   $______________ per each and every calendar day the project remains uncompleted.

2. Said liquidated damage provisions shall remain in effect and continue until final completion and acceptance of the project by the Owner. The Contractor hereby authorizes the Owner to retain sufficient amounts of the monies due it and remaining in the hands of the Owner to pay the damages caused by any such default or defaults.

SECTION 9. INTERPRETATION OF DRAWINGS AND DOCUMENTS

1. If any person contemplating submitting a bid for this proposed project is in doubt as to the true meaning of any of the Contract Documents, or finds discrepancies in, or omissions from them, he may submit to the Director, Physical Plant Department, Brigham Young University, Provo, Utah, a written request for any interpretation or correction thereof. The person submitting the request will be responsible for its prompt delivery. ANY INTERPRETATION OR CORRECTION OF THE CONTRACT DOCUMENTS WILL BE MADE ONLY BY ADDENDUM DULY ISSUED THROUGH THE DIRECTOR, PHYSICAL PLANT DEPARTMENT. A copy of such addendum will be delivered or mailed to each person receiving a set of Contract

Documents. Requests for clarification to receive consideration must be received not later than six (6) calendar days prior to the time and date set for opening of proposals.

2. Should discrepancies appear in the Contract Documents and they are not resolved by an addendum, then it will be expressly understood that the Contractor has bid the job using the most expensive method and/or material.

SECTION 10. ADDENDA

1. Any addenda issued during the time of bidding, or forming a part of the Contract Documents lent to the bidder for the preparation of his proposal, shall be covered in the proposal, and shall be made a part of the Contract.

SECTION 11. FORM OF CONTRACT

1. The form of Contract, which the successful bidder, as Contractor, will be required to execute, will be based on the form bound herewith in the Specifications.

SECTION 12. LOCAL LABOR

1. The Contractor shall, insofar as is possible, employ student and other labor, both common and skilled, referred to him by Brigham Young University, provided such labor is competent. The request for such labor shall be made through the University Employment Service. Membership in a labor union shall not constitute a requirement for employment on this project.

SECTION 13. SUBSTITUTIONS

1. In order to establish a standard, certain brands of equipment or manufactured articles may be described in the specifications by manufacturer's trade name. In such cases, it is not intended to close the specifications against other articles which may warrant consideration if quality, fitness and price were known. Competition among products of equal quality is encouraged because it is in the Owner's interest.

2. The base bid, however, shall include the furnishing of only those items which are explicitly specified together with those properly approved by addendum and any required alternative proposals which may be called for on the Form of Proposal.

3. In addition to the base bid, and the required alternative proposals, if any, any equipment or material supplier, and any subcontractor, and any bidder may, at his option, submit a substitute proposal for any specified material, apparatus, equipment, or process which he considers equal to those specified. This proposed substitution is to be listed where indicated on the Form of Proposal.

4. Any substitute proposal submitted by a bidder shall include the difference in price between said proposal and that required by the Contract Documents.

5. The Owner reserves the right to accept or reject any substitute proposal, but any such acceptance or rejection will not be used by the Owner in determining the recipient of the Contract.

6. Pre-approval of any items not specifically called for by the Contract Documents will not be given prior to the bid opening date except by Addendum, and then only if it is practical to do so. Such items must be submitted to the Owner and the Architect for consideration not later than seven (7) calendar days prior to time set for opening of proposals. All substitute proposals not receiving prior approval and itemized on the Form of Proposal will be reviewed and evaluated by the Owner and the Architect at a later date.

7. On demand of the Owner's agent and/or the Architect, the Contractor, at his own expense, shall furnish information or data concerning the material, apparatus, equipment, or process offered by him as a substitute. If the Owner's agent or the Architect shall so require, the Contractor, at his own expense, shall have the said material, apparatus, equipment, or process tested under the direction of the Owner's agent or the Architect as to its physical and performance characteristics, by an approved testing laboratory.

SECTION 14 - INTENT OF DOCUMENTS

1. THE BIDDER'S ATTENTION IS SPECIFICALLY DIRECTED TO SECTION 3 OF THE GENERAL CONDITIONS ENTITLED "EXECUTION, CORRELATION, AND INTENT OF DOCUMENTS." THE CONTRACTOR IS FOREWARNED THAT THE INTENT OF THIS SECTION IS TO HAVE A COMPLETE AND OPERABLE PROJECT AS PER THE TRUE INTENT OF THE CONTRACT DOCUMENTS AND HE SHALL PREPARE HIS PROPOSAL TO INCLUDE ALL NECESSARY COSTS TO ACHIEVE THIS RESULT.

Name of Contractor ______________________________

Name of Project ______________________________

Date ______________________________

FORM OF PROPOSAL

The undersigned, hereinafter referred to as the bidder, certifies that the following facts and/or circumstances have occurred or exist relating to the proposed work for ______________________________ ______________________________ for the Brigham Young University, Provo, Utah; prepared by ______________________________ ______________________________.

Bidder hereby acknowledges receipt of Owner's Contract Documents, as outlined in the General Index, and represents that he is familiar therewith and if his proposal is accepted, he will be willing to sign the Contract in form shown in the Contract Documents and to execute the bonds in the forms provided.

The bidder further represents that he has examined and is familiar with the Contract Documents; that he has examined the site for the proposed work, including the availability of access roads, utilities and other similar items relating to the performance of the work; that he is familiar with the general and local conditions which can in any way affect the work under the Contract. No verbal agreements or conversations with any officer, agent, or employee of the Owner have been made to the bidder, and the bidder in submitting his proposal is in no way relying thereon.

The undersigned hereby agree(s) to furnish all labor and materials, transportation and services, necessary for the construction of the work set forth in the Contract Documents in strict conformity therewith for the sum of:

______________________________ ($______________) Base Bid.

1. The undersigned further agree (s) if this proposal is accepted to complete the work on or before ______________________________.

ADDENDA

The undersigned acknowledges receipt of Addenda No (s). ________ to ________ inclusive, and has considered the same in preparation of his proposal and/or alternative proposals.

LIQUIDATED DAMAGES

The undersigned is aware of, and agrees to, the conditions for Liquidated Damages as stated in the "Instructions to Bidders," Section 8.

PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

The bid price shown above includes the prices of a 100 per cent Performance Bond, and a 100 per cent Labor and Material Payment Bond.

UNIT PRICES

The following unit prices may be used in computing the value of changes, additions, or deductions in adjusting the Contract price during the period of construction and shall include all proportionate costs such as taxes, insurance, and supervision. Deductions will be based on the net price quoted. Additions will be based on the net price quota, plus 5% to cover all overhead and 10% profit.

NOTE: Architects or Engineers shall add or delete appropriate items.

1. Furnish and install earth fill exterior, 90 per cent compaction, per cu. yd., in place $______________
2. Furnish and install gravel fill, per cu. yd. in place $______________
3. Concrete (no forms, no steel) per cu. yd. in place $______________
    a. 3,000 psi. concrete $______________
    b. 3,500 psi. concrete $______________
    c. 4,000 psi. concrete $______________
4. Concrete forms per sq. ft. including stripping $______________
5. Reinforcing steel in place, per lb. $______________
6. For each sq. ft. of reinforced concrete sidewalk with base and reinforcing complete, per sq. ft. $______________
7. Concrete curb and gutter, including forms, scoring and expansion joints, per lin. ft. complete $______________
8. For each sq. ft. of asphalt paving with preparation of subgrade and base courses and surface course as specified, per sq. ft. $______________

TYPE OF BIDDER'S ORGANIZATION

____

Official Name of Organization

____

Corporation, Co-Partnership, Individual, or other

____

Address

Names of Individual Members of Firm

____

____

____

____

Name of President of Corporation:

____

Name of Secretary of Corporation:

____

Corporation is organized under the laws of the State of:

____

SIGNATURE MUST BE AFFIXED HERE:

Signature ________________________

Title or Office ________________________

Legal Address ________________________

____

(   )
) Seal (
(   )

PROPOSED SUBSTITUTE MATERIALS

The total sum of the Contractor's proposal shall include the furnishing and installing of all materials, equipment and labor as called for in the Contract Documents.

Hereafter give the total amount to be added or deducted for a complete installation if equipment or materials other than those specified and those approved by addendum are submitted for the Owner's consideration. All materials and equipment proposed for substitution shall be listed below and must meet the requirements of the Contract Documents. During the time of consideration of the proposals, complete information shall be submitted immediately to the Architect and Owner's Representative. The Contractor is referred to Section 13 of the Instruction to Bidders, "Substitution," for requirements relative to proposed substitutions.

Proposed Substitute	Manufacturer and Catalog Numbers	$ Add	$ Deduct

BIDDER'S LIST OF SUBCONTRACT BIDS USED IN PROPOSAL

(LIST OF SUBCONTRACTORS)

Project:____ Project No.__________
Brigham Young University, Provo, Utah

(Fill in appropriate subcontract classifications).

Div.	Subcontract Classification	Subcontractor Used	Amount

____
Bidder's Name

____
Signed

(Typical Form)

SUPPLEMENTAL GENERAL CONDITIONS

(The Architect shall add or delete from the Supplemental General Conditions as required by the contitions to satisfy the conditions encountered on the particular project for which he is preparing contract documents).

SECTION 1 - TEMPORARY FACILITIES

1. Temporary Lighting: The Contractor shall furnish, install, and maintain a minimum of four 500-watt flood lights (including all wiring and other necessary equipment) located about the project where required to properly illuminate the construction area. These lights are to be mounted on posts a minimum of 14 feet from the ground in locations approved by the Owner's representative. Lights shall be operated from one-hour after sundown to one-half hour before sunrise.

SECTION 2 - TEMPORARY PROTECTIVE FENCING

1. Temporary Protective Fencing: Provide a temporary woven wire fence as a protective enclosure following the project limit lines of the project as shown in the drawings. Fence is to be continuous but with sufficient gates as noted hereafter, 6-foot height without top rail. Erect sufficiently taut to maintain a uniform top level to the fence.

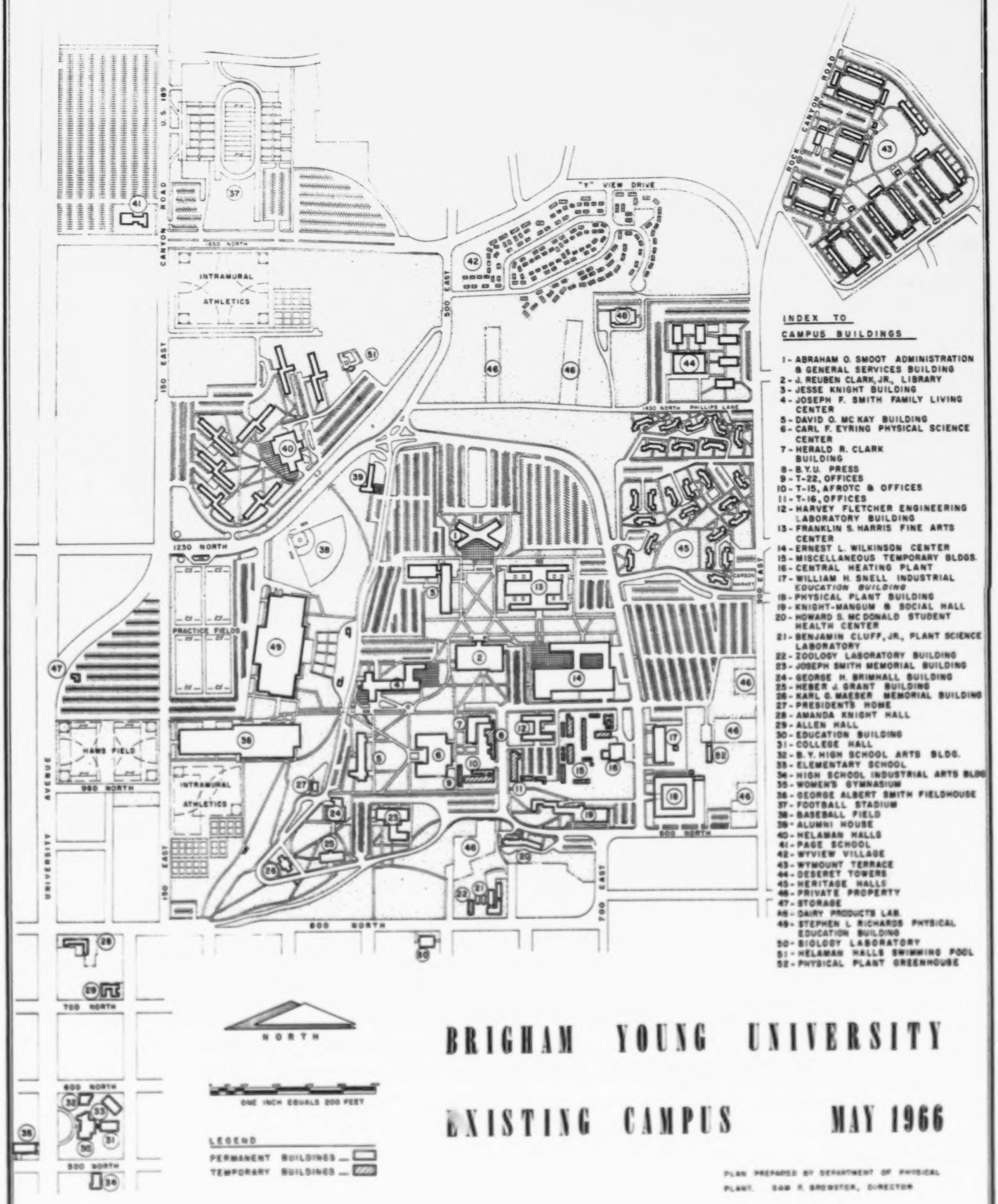
2. The fabric mesh is to be 2" x 4" diamond mesh, Style I, with horizontal wires of two twisted strands of No. 12-1/2 gauge and cross wires of No. 14 gauge; all of copper bearing steel "flame sealed against rust."

3. Line posts are to be Tee section, studded, 8-foot length. The posts are to be drive-in type with anchors to secure posts firmly into position. Terminal and corner posts are to be 8-foot length made of 2-1/2" x 2-1/2" x 1/4" angle of the same length as the post. Line posts are to be spaced not greater than 12 feet o. c. The fence is to be installed true to line and plumb.

4. Provide necessary gates, not to exceed four, as directed, about the structure. Gates are to be 24 feet wide, double swing type formed of 1-1/4" steel pipe with welded joints, fully braced, and covered with fabric mesh as specified for the fencing. Provide gate with hinges of type and size suitable to the weight of the gate and provide a means of positive locking.

5. Upon completion of the project the Contractor shall remove the fence and roll the fabric into rolls approximately 100 feet in length and deliver all units of the fence to the point on the University Campus designated by the Owner's Representative.

Best available copy


U. S. 189
CANYON ROAD
1650 NORTH
"Y" VIEW DRIVE
ROCK CANYON ROAD
INTRAMURAL ATHLETICS
500 EAST
150 EAST
1430 NORTH PHILLIPS LANE
1230 NORTH
PRACTICE FIELDS
HAWS FIELD
950 NORTH
900 EAST
UNIVERSITY AVENUE
800 NORTH
700 EAST
700 NORTH
600 NORTH
500 NORTH
NORTH
ONE INCH EQUALS 200 FEET

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BRIGHAM YOUNG UNIVERSITY

EXISTING CAMPUS MAY 1966

LEGEND
PERMANENT BUILDINGS — ▭
TEMPORARY BUILDINGS — ▨

PLAN PREPARED BY DEPARTMENT OF PHYSICAL PLANT. SAM F. BREWSTER, DIRECTOR

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That ______________________________

______________________, of ______________________________________ as

Principal, hereinafter called Contractor, and ______________________________

Surety, hereinafter called Surety, are held and firmly bound unto ______________

__________, as Obligee, hereinafter called Owner, in the amount of __________

______________________($__________________), for the payment whereof Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Contractor has by written agreement dated ____________________,

entered into a contract with Owner for ______________________________

______________________ in accordance with drawings and specifications prepared by ______________________, Architect, which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS such that, if Contractor shall promptly and faithfully perform said contract, then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the Owner.

Whenever Contractor shall be, and declared by Owner to be in default under the Contract, the Owner having performed Owner's obligations thereunder, the Surety may promptly remedy the default, or shall promptly:

1. Complete the Contract in accordance with its terms and conditions, or

2. Obtain a bid or bids for submission to Owner for completing the Contract in accordance with its terms and conditions, and upon determination by Owner and Surety of the lowest responsible bidder, arrange for a contract between such bidder and Owner, and make available as work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the contract price," as used in this

paragraph, shall mean the total amount payable by Owner to Contractor under the Contract and any amendments thereto, less the amount properly paid by Owner to Contractor.

Any suit under this bond must be instituted before the expiration of two (2) years from the date on which final payment under the contract falls due.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the Owner named herein or the heirs, executors, administrators or successors of Owner.

Signed and sealed this _______ day of _________________________, A.D., 196_____

IN THE PRESENCE OF:

_________________________ _________________________ (Seal)
Principal

____
Title

_________________________ _________________________ (Seal)
Principal

____
Title

LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That ______________________________

______________________________, of ______________________________ as

Principal, hereinafter called Principal, and ______________________________

______________________________, as Surety, hereinafter

called Surety are held and firmly bound unto ______________________________

______________________________, as Obligee, hereinafter called Owner, for

the use and benefit of claimants as hereinbelow defined, in the amount of __________

______________________________ Dollars ($______________________), for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, Principal has by written agreement dated ______________________________,

entered into a contract with Owner for ______________________________

______________________________ in accordance with drawings and specifi-

cations prepared by ______________________________ which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal shall promptly make payment to all claimants as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contract, then this obligation shall be void; otherwise, it shall remain in full force and effect, subject, however, to the following conditions:

1. A claimant is defined as one having a direct contract with the Principal or with a subcontractor of the Principal for labor, material, or both, used or reasonably required for use in the performance of the contract, labor and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental of equipment directly applicable to the Contract.

2. The above named Principal and Surety hereby jointly and severally agree with the Owner that every claimant as herein defined, who has not been paid in full before the expiration of a period of ninety (90) days after the date on which the last of such claimant's work or labor was done or performed, or materials were furnished by such claimant, prosecute the suit to final judgment for such sum or sums as may be justly due claimant and have execution thereon. The Owner shall not be liable for the payment of any costs or expenses of any such suit.

3. No suit or action shall be commenced hereunder by any claimant.

   a. Unless claimant, other than one having a direct contract with the Principal, shall have given written notice to any two of the following: The Principal, the Owner, or the Surety above named, within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the Principal, Owner or Surety, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service *need not be made by* a public officer.

   b. After the expiration of one (1) year following the date on which Principal ceased work on said contract, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

   c. Other than in a state court or competent jurisdiction in and for the county or other political subdivision of the state in which the project, or any part thereof, is situated or in the United States District Court for the district in which the project, or any part thereof, is situated, and not elsewhere.

4. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder, inclusive of the payment by Surety of mechanic's liens which may be filed of record against said improvement, whether or not claim for the amount of such lien be presented under and against this bond.

Signed and sealed this ________ day of ______________________________ A.D., 19____.

IN THE PRESENCE OF:

______________________________ ______________________________(Seal)

Principal

____

Title

______________________________ ______________________________(Seal)

Surety

____

Title

STATE OF________________)
) ss
COUNTY OF_______________)

____, being first duly sworn an oath, deposes and says, that he is the __________________ of said Surety Company, and that he is duly authorized to execute and deliver the foregoing obligation; that said Surety Company is authorized to execute the same and has complied in all respects with the laws of ____________________ in reference to becoming sole Surety upon bonds, undertakings and obligations.

____

Subscribed and sworn to before me this _____ day of ______________________19_____.

____

Notary Public

My Commission Expires:

____

CONTRACT FOR CONSTRUCTION OF______________________

PROJECT NO. ___________________

AT BRIGHAM YOUNG UNIVERSITY

THIS AGREEMENT, made and executed in triplicate original as of the __________ day of _______________, 19___, by and between BRIGHAM YOUNG UNIVERSITY, a Utah corporation, having its principal office at Provo, Utah, (hereinafter referred to as "Owner"), and ____________________________________ of _______________ _____________, ________________, Utah, (hereinafter referred to as "Contractor").

WITNESSETH:

That for and in consideration of the payments hereinafter specified to be paid by the Owner to the Contractor and the covenants and agreements herein contained to be kept and performed by the parties hereto, the Contractor agrees to build and construct the proposed ____ Project at Brigham Young University in Provo, Utah, and to furnish all labor, supervision, equipment, transportation and power, to furnish and deliver all materials, and perform and supervise all work as required herein and by the plans and the specifications herein mentioned, all of which shall collectively constitute the contract, and shall hereinafter be referred to collectively as "The Contract."

ARTICLE I. THE IDENTIFICATION OF CONTRACT DOCUMENTS.

A. The "plans" referred to above for the ______________________________ Project consist of __________________ drawing(s), prepared by ________________ ______________________________, Architects, which plans are identified as follows:

B. The Specifications referred to above consist of Specifications for ____ as prepared by ______________________________Architect, and approved on ____________________________, 19____. These specifications contain the following:

ARTICLE II. DATE OF COMPLETION

The Contractor agrees to complete the work required by The Contract on or before midnight __________________, 19____. Time is hereby expressly declared to be of the essence of The Contract.

ARTICLE III. THE CONTRACT SUM.

The Owner agrees to pay the Contract, in accordance with the terms hereof, a total of $__________________, which sum the Contractor agrees to accept as full compensation for performing his obligations under The Contract. Said sum is computed from the bid made by the Contractor in the following manner:

ARTICLE IV. ITEMS TO BE FURNISHED BY THE OWNER.

The Owner will furnish ground area for storage facilities for the Contractor and his subcontractors. Such storage area shall be in the general vicinity of the work, but in areas designated by the Owner. The Owner will not be required to furnish any other service or item except those which are expressly designated in the Specifications to be furnished by it.

ARTICLE V. CONTRACTOR NOT AGENT OF OWNER.

It is expressly agreed that the Contractor is not the agent or employee of the Owner, but that he is an independent contractor. He shall not pledge or attempt to pledge the credit of the Owner or in any way attempt to bind the Owner by contract or otherwise. However, the Owner may elect to appoint the Contractor its agent for such purposes as may be decided by the Owner and agreeable to the Contractor. The Owner also reserves the right to purchase and furnish to the Contractor such of the materials as it may desire, in which event the cost thereof, as figured in the Contractor's bid, shall be deducted from the contract sum specified in ARTICLE III hereof.

ARTICLE VI. ATTORNEYS' FEES.

The Contractor agrees to pay any cost incurred by the Owner in enforcing the Contract, or for any breach thereof, including attorneys' fees in a reasonable amount.

ARTICLE VII. OWNER TO APPOINT AUTHORIZED AGENT.

The President of the Owner hereby appoints ______________________________ as its authorized agent. Said authorized agent may be replaced from time to time by another or others appointed by the President of the Owner, in which event the Contractor shall be given written notification of the change. The Contractor is authorized at any and all times to communicate with such agent and give any notices, make any requests, and follow the directions of said agent; provided, however, that any directions which constitute a change in the scope of the work must be given in writing.

ARTICLE VIII. INSPECTION.

While the Owner expects to have inspectors on the job at all times to inspect the work as it progresses, it does not obligate itself to do so. It is expressly agreed that the fact that the Owner has inspectors on the job shall not release the Contractor from performing in strict accordance with The Contract, and the fact that any particular work has been inspected shall not be a waiver on the part of the Owner of strict compliance with The Contract.

ARTICLE IX. CONTRACTOR TO APPOINT AUTHORIZED AGENT.

The Contractor hereby appoints ______________________________ as agent and superintendent, and agrees that he will be assigned to the project. The Contractor also agrees that all notices, requests, and instructions given to the said ______________________________, agent, shall be considered as having been given to the Contractor.

IN WITNESS WHEREOF, the Owner has caused this instrument to be signed by its President, attested by its Secretary, and its corporate seal to be hereunto affixed, and the Contractor has hereunto affixed his signature as of this day and year in this contract first above written.

BRIGHAM YOUNG UNIVERSITY,
a Utah corporation,

Attest:

By______________________________
Secretary

By______________________________
President
Owner

Signed by the Contractor in the presence of:

____

____
Contractor

APPROVED:

____
The Church Building Committee

BRIGHAM YOUNG UNIVERSITY
PROVO, UTAH

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GENERAL CONDITIONS

SECTION 1 - GENERAL

These General Conditions are hereby made a part of each section of the specifications with the same force and effect as if wholly embodied therein.

SECTION 2 - PRINCIPLES AND DEFINITIONS

1. The Contract Documents consist of the General Index, Instructions to Bidders, Form of Proposal, Form of Bond, Form of Contract, General Conditions, Supplemental General Conditions, General Scope of Work, Detailed Specifications and Drawings, including all modifications thereof incorporated in the documents before their execution. These form the Contract.

2. Owner: The word "Owner" or pronoun in place thereof shall designate the Brigham Young University of Provo, Utah, or its duly authorized representative.

3. Architect: The word "Architect" or pronoun in place thereof shall designate the person, firm or corporation with whom the Brigham Young University has a contract.

4. Contractor: The word "Contractor" or pronoun in place thereof shall designate the person, firm or corporation with whom the Contract is made with the Brigham Young University, Provo, Utah.

5. Owner's Representative: The term "Owner's Representative" refers to the authorized representative of the Brigham Young University having supervisory responsibilities for the project.

6. The term Subcontractor, as employed herein except as defined for bidding purposes in the Instructions to Bidders, includes only those having a direct contract with the Contractor and it includes one who furnishes material worked to a special design according to the plans or specifications of this work, but does not include one who merely furnishes material not so worked.

7. Written notice shall be deemed to have been duly served (a) upon the Contractor if delivered in person to the Contractor's designated representative or to a member of the firm or if delivered at or sent by registered mail to the last business address known to the Owner; and (b) upon the Owner if delivered in person to the Owner's Representative or if delivered at or sent by registered mail to the last business address known to the Contractor.

8. The Owner, the Contractor, the Subcontractor, and the Architect are those mentioned as such in the Agreement. They are treated throughout the Contract Documents as if each were of the singular number and masculine gender.

9. The term "work" of the Contractor or Subcontractor includes labor or materials or both.

10. All time limits stated in the Contract Documents are of the essence of the Contract.

11. The law of the place of building shall govern the construction of this Contract.

SECTION 3 - EXECUTION, CORRELATION AND INTENT OF DOCUMENTS

1. The Contract Documents shall be signed in duplicate by the Owner and the Contractor. In case the Owner and Contractor fail to sign the General Conditions, Drawings or Specifications, the Architect shall identify them in the executed formal agreement between the two parties which will be based on the Form of Contract bound in the Specifications.

2. The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intention of the documents is to include all labor and materials, equipment, and transportation necessary for the proper execution of the work, all of which shall be equal in quality and workmanship to the highest standards. The Contractor shall abide by and comply with the true intent and meaning of all Drawings and Specifications taken as a whole, and shall not avail himself to the detriment of the work of any manifestly unintentional error or omission, should any exist. All minor details of work, which are not shown on the Plans, as well as such items which are not specifically mentioned in these Specifications but are obviously necessary for the proper completion of the work, shall be considered as incidental and as being part of the work.

3. Materials or work described in words which so applied have a well known technical or trade meaning shall be held to refer to such recognized standards.

4. For convenience or reference and to facilitate letting of Subcontracts, these Specifications are separated into Sections. These separations shall not operate to make Architect or Owner's Representative an arbiter to establish subcontract limits between Contractor and Subcontractors.

SECTION 4 - DETAIL DRAWINGS AND INSTRUCTIONS

1. The Architect shall furnish with reasonable promptness, additional instructions, by means of drawings or otherwise, necessary for the proper execution of the work. All such drawing and instructions will be consistent with the Contract Documents, true developments thereof, and reasonably inferable therefrom.

2. The work shall be executed in conformity therewith, and the Contractor shall do no work without proper drawings and instructions. Any work constructed in advance of the receipt of these detail drawings and instructions by the Contractor shall be constructed entirely at his own risk.

3. The Contractor and/or Owner's Representative, if either so requests, shall jointly prepare a schedule, subject to change from time to time in accordance with the progress of the work, fixing the dates at which the various detail drawings will be required, and the Architect will furnish them in accordance with that schedule. Under like conditions, a schedule shall be prepared, fixing the dates for the submission of shop drawings, for the beginning of manufacture and installation of materials and for the completion of the various parts of the work. A detailed progress schedule shall be prepared by the General Contractor before submittal of his first monthly payment request. This shall be done on a form and in a manner acceptable to the Owner's Representative.

4. If work is required in a manner to make it impossible to produce first-class work, or should discrepancies appear among the Contract Documents, the Contractor must request an interpretation before proceeding with the work. If the Contractor fails to make such request, no excuse will thereafter be entertained for failure to carry out work in a satisfactory manner. Should conflicts occur in, or between Drawings and Specifications, the Contractor is deemed to have estimated the more expensive way of doing the work unless he shall have asked for and obtained a written decision before submission of their Proposal as to which method or materials will be required.

SECTION 5 - COPIES FURNISHED

Unless otherwise provided in the Contract Documents the Owner will furnish to the Contractor, free of charge, all copies of drawings and specifications reasonably necessary for the execution of the work. Before final payments shall be made, all sets not returned must be satisfactorily accounted for.

SECTION 6 - DIMENSIONS

When no figures or memoranda are given, the drawings shall be accurately followed according to their scale, but figures or memoranda are to be preferred to the scale, in all cases of difference; and the large scale details shall take preference over those of smaller scale.

SECTION 7 - SHOP DRAWINGS

1. The Contractor shall prepare and submit with such promptness as will cause no delay in the work and in accordance with the schedule for submission of drawings, if there is one, layout, detail, schedules, settings, samples, shop drawings or such parts or work as specified or required.

2. Shop drawings (not originating with the Contractor) must be cleared with the Contractor for accuracy and completeness before being submitted. See that work contiguous with, and having bearing on, work indicated on shop drawings is accurately and distinctly illustrated, and that indicated work complies with Contract requirements.

3. Number shop drawings consecutively. Indicate:

   a. Working and erection dimensions.

   b. Arrangements and sectional views.

   c. Necessary details, including complete information for making connections with other work.

   d. Kinds of materials and finishes.

4. Date shop drawings, indicate project name, descriptive names of equipment, materials, classified item numbers, locations at which materials or equipment are to be installed in work.

5. Do not execute work required by shop drawings until written approval is given.

6. If shop drawings show variations from Contract requirements because of standard shop practice, or other reasons, make specific mention of such variations in submittal letter. Shop drawings approval will be general. It shall not relieve the Contractor of responsibility for accuracy of such shop drawings, nor for proper fitting, construction of work, furnishing of materials or work required by Contract and not indicated on shop drawings. Shop drawing approval shall not be construed as approving departures from Contract requirements, unless specifically noted to that effect in writing by the Architect.

7. Submittal procedure for shop drawings, samples, materials, equipment, etc., shall be as follows:

   a. The Owner will provide the General Contractor with printed pads of Transmittal Sheets. For each submittal to the Architect, the General Contractor shall accurately and legibly prepare one set of this transmittal form (six [6] copies), numbering transmittals consecutively. He shall retain the Contractor's pink copy and forward the Owner's (blue) copy along with the submission. The remaining four copies shall be forwarded to the Architect.

   b. All shop and setting drawings shall be submitted to the Architect in the form of an ozalid tracing (reproducible) measuring 40" x 21 1/2". Simultaneous with the General Contractor's submittal to the Architect, he shall submit to the Owner the blue copy of the transmittal and a black or blue line print of the ozalid tracing. Drawings shall have an adequate title block which shall include space for addition of project name and identification number.

   c. The Architect will make his corrections and notations on the ozalid reproducible and return it to the Contractor. When in his judgment the corrections and notations are minor in nature, the Architect will put his stamp "approved as noted" on the tracings.

d. At the discretion of the Architect, the General Contractor shall resubmit an ozalid reproducible incorporating the Architect's corrections and any other corrections or additional information for the Architect's approval. The Architect will return this tracing with his notations or approval.

e. The Contractor shall then furnish one set of prints of the shop drawings approved by the Architect to the Owner and will forward the original (white copy) of the Shop Drawing Transmittal simultaneously. The Contractor shall furnish as many sets of the approved shop drawings as required to expedite the work.

SECTION 8 - DRAWINGS AND SPECIFICATIONS ON THE WORK

The Contractor shall keep one copy of all drawings and specifications, on the work, in good order, available to the Architect and the Owner's Representative.

SECTION 9 - RETURNING OF DRAWINGS AND MODELS

All drawings, specifications and copies thereof shall not be used on other work and, with the exception of the signed contract set, shall be returned to the Owner at the completion of the work. All models are the property of the Owner.

SECTION 10 - SAMPLES

1. Submit, without causing delay in work, samples as specified or required, as per Section 7, Subparagraph 7.

2. Submit names of proposed manufacturers, material suppliers, dealers who are to furnish materials, fixtures, appliances, or other fittings for approval as early as possible, to afford proper investigation and checking.

3. No manufacturer will be approved for any materials to be furnished under the Contract unless he is of good reputation, has ample plant capacity, and has successfully produced similar products.

4. In asking for material prices, provide manufacturer or dealer with complete information from specifications and drawings. Inform manufacturer or dealer of pertinent Contract requirements.

5. Label each sample with material name, quality, Contractor's name, date, project name, other pertinent data.

6. Where specifications require manufacturer's printed installation direction, submit duplicate copies of such directions with samples submitted for approval.

7. Prepay transportation charges to Owner's Representative's Office on samples forwarded.

8. Do not order materials until receipt of written approval is received. Furnish materials equal in every respect to approved samples.

SECTION 11 - MATERIALS, APPLIANCES, EMPLOYEES

1. Except as otherwise stipulated elsewhere herein, the Contractor shall provide and pay for all materials, labors, tools, equipment, light, power, water, transportation and other facilities necessary for the execution and completion of the work. Accompany application for final payment with receipted bill setting forth the charges for same have been fully paid by Contractor. Use care to prevent water and power waste. Maintain valves, connections, and hoses in first-class condition.

2. Unless otherwise specified, all materials shall be new and both workmanship and materials shall be of good quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

3. The Contractor shall at all times enforce strict discipline and good order among his employees, and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him.

SECTION 12 - ROYALTIES AND PATENTS

The Contractor shall hold and save the Owner harmless from and against all and every demand, of any nature or kind for or on account of the use of any patented invention, article, or appliance included in the material or supplies hereby agreed to be furnished under this Contract. The Contractor shall pay such royalties and secure such valid licenses as may be requisite and necessary to enable the Owner to use such invention, article, or material without being disturbed or in any way interfered with by any proceeding in law or equity on account thereof.

SECTION 13 - SURVEYS, PERMITS AND REGULATIONS

1. Permits and licenses of a temporary nature for the prosecution of the work shall be secured and paid for by the Contractor. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured by the proper Contractor and paid for by the Owner, unless otherwise specified.

2. The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the drawings and specifications are at variance therewith, he shall promptly notify the Owner in writing, and any necessary changes shall be adjusted, as provided in the Contract for changes in the work. If the Contractor performs any work contrary to such laws, ordinances, rules and regulations and without such written notice to the Owner, he shall bear all costs arising therefrom.

3. The Owner shall establish base lines and bench marks at convenient points about the project. From this basic data the Contractor shall lay out the entire project as shown on the drawings or as directed. All work shall

be laid out accurately by personnel properly trained in the type of work to be so done. All walks, utility lines,etc., shall be laid out by licensed Engineers or Surveyors. All "As Built" drawings shall be prepared by licensed Engineers, Surveyors, or Architects.

4. The General Contractor will be required to secure a building permit as required by Provo, Utah, and to be paid for by the Owner.

5. The Plumbing and Heating Contractor or Subcontractor shall secure from Provo permits and inspection pertaining to their work. Such permits are to be paid for by the Owner.

6. The Electrical Contractor shall secure from Provo a permit for Electrical Wiring and Inspection. Permits are to be paid for by the Owner.

SECTION 14 - PROTECTION OF WORK AND PROPERTY

1. The Contractor shall continuously maintain adequate protection for all his work from damage and shall protect the Owner's property from injury or loss arising in connection with this Contract. He shall make good any such damage, injury or loss, except as may be directly due to errors in the Contract Documents or caused by agents or employees of the Owner. He shall adequately protect adjacent property as provided by law and the Contract Documents. Particular attention shall be given to pedestrian and vehicular traffic areas. These shall be maintained in such a manner as to provide adequate and safe passage at all times. Keep traffic areas free from water, snow, mud, dirt, rocks, debris or other obstructions.

2. The Contractor shall take all necessary precautions for the safety of employees on the work and shall comply with all applicable provisions of Federal, State, and Municipal Safety Laws and Building Codes to prevent accidents or injury to persons on, about or adjacent to the project and properly maintain at all times, as required by the conditions and progress of the work, all necessary safeguards for the protection of workman and the public, and shall post danger signs warning against the hazards created by such features of construction as protruding nails, hod hoists, well holes, elevator hatchways, scaffolding, window openings, stairways and falling materials, etc. He shall designate a responsible member of his organization on the work, whose duty shall be the prevention of accidents. The name and position of the person so designated shall be reported to the Owner's Representative.

3. Water Protection: Always protect excavation, trenches, building, from damage, from rain water, spring water, ground water, backing up of drains or sewers, irrigation water or other water; provide pumps, equipment, enclosurers, to insure this protection.

4. Temporary Drainage: Construct, maintain necessary temporary drainage; do dumping necessary to keep excavation or lowest floor free of water.

5. Snow, Ice: Remove snow, ice, etc., as necessary for safety and proper execution of work.

6. Guard Lights: Provide and maintain guard lights at barricades, railways, obstructions in streets, road or sidewalks and at trenches or pits adjacent to roads.

7. Weather Protection: Provide constant protection against rain, wind, storms, frost or heat so as to maintain work, materials, apparatus and fixtures free from injury or damage. At end of day's work, cover work likely to be damaged.

8. Damage: Remove work damaged by failure to provide protection or other reasons; replace with new work without extra cost to Owner.

9. Irrigation Water: Carefully examine site for irrigation ditches, canals, etc. Protect and maintain these waterways unless otherwise specified.

10. Protection of Trees and Shrubs: Before ANY mechanized equipment is moved on to the job site, all trees and shrubs that are marked by the Owner to stay on the project shall be protected by barricades consisting of 4" x 4" posts driven at least three feet into the ground and stationed around the trees or shrubs in such a position as to protect the trees or shrubs from mechanized equipment. Between the posts shall be securely attached 2" x 8" planks. In addition to the above, all trees shall be protected from the ground up to the bottom branches or eight feet, whichever is the least distance, by 4" x 4" timbers securely wired around the trunk of the tree. These protective devices shall be maintained and remain in place until there is no longer a danger of damage to the trees and shrubs at the end of the project.

SECTION 15 - INSPECTION OF WORK

1. The Architect and Owner's Representative shall at all times have access to the work whereever it is in preparation or progress and the Contractor shall provide proper facilities for such access and for inspection.

2. If the Specifications, Owner's Representative, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give the Owner timely notice of its readiness for inspection. If the inspection is by any authority, other than the Owner's Representative, the date of the inspection shall be cleared by the Owner's Representative. Inspections by the Owner's Representative shall be promptly made, and where practicable at the source of supply. If any work should be covered up without approval or consent of the Owner's Representative, it must, if required by him, be uncovered for examination at the Contractor's expense.

3. Re-examination of questioned work may be ordered by the Owner's Representative and if so ordered, the work must be uncovered by the Contractor. If such work be found in accordance with the Contract Documents, the Owner

shall pay the cost of re-examination and replacement. If such work shall not be found in accordance with the Contract Documents, the Contractor shall pay such cost of defective workmanship and/or material and replacement, in accordance with plans and specifications.

SECTION 16 - CONTRACTOR'S SUPERVISION

1. The Contractor shall in writing designate and keep continuously on his work, during its progress and until the project is finally accepted, a competent superintendent and any necessary assistants, all satisfactory to the Owner's Representative. The superintendent shall not be changed except with the written consent of the Owner's Representative unless the superintendent proves to be unsatisfactory to the Contractor and ceases to be in his employ. The superintendent shall represent the Contractor in his absence and all directions given to him shall be as binding as if given to the Contractor. Important directions shall be confirmed by writing to the Contractor. Other directions shall be so confirmed on written request in each case.

2. The Contractor shall give efficient supervision to the work, using his best skill and attention. He shall carefully study and compare all drawings, specifications and other instructions and shall at once report to the Owner's Representative any error, inconsistency or omission which he may discover, but he shall not be held responsible for their existence or discovery.

3. The Contractor shall render his assistance to other mechanics in every way in which his special work can be of service, and such assistance shall be given promptly and thoroughly as part of this Contract.

SECTION 17 - TESTS AND INSPECTIONS

1. All tests and inspections, of any kind, not specifically required hereinafter in the Specifications, or as may be requested by the Owner's Representative, and which involve expense, shall be paid for by the Owner. However, the cost of tests or inspections ordered especially by authorized persons, for the purpose of proving the existence of faulty material or workmanship proved to be faulty, shall be borne by the Contractor. If faulty standards are not proven from such tests or inspections the cost of same shall be paid by the Owner.

2. All tests of materials will be made by a Testing Engineer or Laboratory selected by the Owner's Representative; except as specified above the costs of all tests will be paid by the Owner.

3. The Contractor shall furnish all samples of material required by the Owner's Representative for such purposes to the Testing Engineer or Laboratory in timely manner, the samples being selected in accordance with the directions of the Owner's Representative or Testing Engineers.

SECTION 18 - CHANGES IN THE WORK

1. The Owner without invalidating the Contract, may order extra work or make changes by altering, adding to or deducting from the work, the Contract sum being adjusted accordingly. All such work shall be executed under the conditions of the original contract except that any claim for extension of time caused thereby shall be adjusted at the time of ordering such change. IF NO EXTRA TIME IS CLAIMED AND ALLOWED AT SUCH TIME IT SHALL BE CONCLUSIVELY PRESUMED THAT NO EXTRA TIME IS INVOLVED.

2. No changes from the plans and specifications shall be made unless authorized in writing by the Owner's Representative. Any changes made by the Contractor without such authorization are subject to removal and restoration to the details shown by the Contractor at his sole expense.

3. Contractor shall not be entitled to any payment for extra work performed in connection with the work provided for herein, unless such work and the payment for same shall have been authorized in writing by the Owner's Representative before it is performed.

4. All such changes, additions or deductions, shall be invoiced monthly.

5. Value of such extra work or change shall be determined as follows:

   a. By estimate and acceptance in lump sum.

      1. The cost of any change, addition or deduction, shall be determined on a net field cost basis which shall include all direct labor, payroll insurance and taxes, materials, equipment rental as outlined in Paragraph (3) below, insurance and any other direct on-site or approved off-site expense incurred in connection with such change, addition or deduction. It shall not include the cost of general supervision at or away from the site, general overhead, coordination, management, home office expense, etc., nor profit.

      2. The net field cost shall be determined following the preparation of detailed itemized estimates of the cost of such change, addition or deduction, one by the Contractor, and one by the Owner's Representative following which the cost value shall be mutually agreed to.

      3. Equipment Rental: Equipment rental rates used in connection with the value of any change, addition, or deduction shall, in lieu of other demonstrated basis, and in any event be not more than 75% of the current edition of the Associated Equipment Dealer's schedule. This price shall include all overhead, profit, fuel lubrication and maintenance. There shall be no additive percentages allowed on equipment rental.

      4. Additive Changes: Each Subcontractor or General Contractor that actually performs work shall be allowed 5% to cover all overhead and 10% for profit on the net field costs of such changes, excluding

equipment rental. If the Subcontractor is a Subcontractor to any other Subcontractor or General Contractor, then the latter Subcontractor or General Contractor will be allowed 5% to cover all overhead on the former Subcontractor's total cost excluding equipment rental.

5. Deductive Changes: Deductive changes shall be determined on a net field cost.

b. By cost plus fixed percentages: Should the nature of such change, addition or deduction, preclude in advance an accurate determination of the probable net field cost, the Contractor shall upon written authorization of the Owner's Representative, proceed with the work, maintaining accurate records of the field cost thereof, in accordance with Section 18, sub-section 5-a (1) (3). All invoices for changes in work shall be accompanied by detailed supporting data on labor, materials, and equipment and daily time cards of workmen and equipment approved daily by the Owner's Representative. The additive percentages shall be as specified in Section 18, sub-section 5-a (4).

SECTION 19 - CLAIMS FOR EXTRA COST

If the Contractor claims that any instructions by drawings or otherwise involve extra cost under this Contract, he shall give the Owner written notice thereof within seven days after the receipt of such instructions, and in any event before proceeding to execute the work, except in emergency endangering life or property, and the procedure shall then be as provided for changes in the work. No such claim shall be valid unless so made.

SECTION 20 - DEDUCTIONS FOR UNCORRECTED WORK

If the Owner deems it expedient to correct work injured or done not in accordance with the Contract, an equitable deduction shall be made from the contract price, said deduction to consist of the difference in value plus a fair allowance for damage.

SECTION 21 - DELAYS AND EXTENSION OF TIME

1. If the Contractor be delayed at any time in the progress of the work by any act or neglect of the Owner, or any of its employees, or by any separate Contractor employed by the Owner, or by changes ordered in the work, or by strikes, lockouts, fire, unusual delay in transportation, unavoidable casualties or any causes beyond the Contractor's control, or by delay pending arbitration, then the time of completion shall be extended for such reasonable time as may be agreed upon by the Owner and Contractor.

2. If Contractor contends that the Owner or any representative of the Owner is delaying performance under this Contract, Contractor shall promptly serve notice in writing to that effect on Owner, identifying the person causing the delay, and the manner in which the delay is being caused.

3. Weather conditions shall not be considered as cause of delay unless of such an abnormal and severe nature that it would not be normally expected in this region and climate and then only if it can be demonstrated that such abnormal weather caused a serious delay in the prosecution of the work. It is assumed that the Contractor has taken into account the typical weather conditions of the area.

4. No such extension shall be made for delay occuring more than seven (7) days before claim thereof is made in writing to the Owner. In the case of a continuing cause of delay, only one claim is necessary.

5. If no schedule or agreement stating the dates upon which drawings shall be furnished is made, then no claim for delay shall be allowed on account of failure to furnish drawings until two weeks after demand for such drawings and not then unless such claim be reasonable.

SECTION 22 - CORRECTION OF WORK BEFORE FINAL PAYMENT

1. The Contractor shall promptly remove from the premises all materials condemned by the Owner as failing to conform to the Contract whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute his own work in accordance with the Contract and without expense to the Owner and shall bear the expense of making good all work of other contractors destroyed or damaged by such removal or replacement.

2. If the Contractor does not remove such condemned work and materials within a reasonable time, fixed by written notice, the Owner may remove them and may store the material at the expense of the Contractor. If the Contractor does not pay the expense of such removal within ten days' time thereafter, the Owner may, upon ten days' written notice, sell such materials at auction or at private sale and shall account for the net proceeds thereof, after deducting all the costs and expense that should have been borne by the Contractor.

SECTION 23 - CORRECTION OF WORK AFTER FINAL PAYMENT

Neither the final certificate nor payment nor any provision in the Contract Documents shall relieve the Contractor of responsibility for faulty materials or workmanship and, unless otherwise specified, he shall remedy any defects due thereto and pay for any damage to the other work resulting therefrom, which shall appear within a period of one year from the date of acceptance by Owner. The Owner shall give notice of observed defects with reasonable promptness. All questions arising under this section shall be subject to arbitration.

SECTION 24 - THE OWNER'S RIGHT TO DO WORK

If the Contractor shall neglect to prosecute the work properly or fail to perform any provision of this Contract, the Owner, after three days' written notice to the Contractor may, without prejudice to any other remedy he may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

SECTION 25 - OWNER'S RIGHT TO TERMINATE CONTRACT

If the Contractor should be adjudged or bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, or if he should persistently or repeatedly refuse or should fail, except in cases of which extension of time is provided, to supply enough properly skilled workmen or proper materials, or if he should fail to make prompt payment to subcontractors or for materials or labor, or persistently disregard laws or ordinances, or otherwise be guilty of a substantial violation of any provision of the Contract, then the Owner may, without prejudice to any other right or remedy and after giving the Contractor seven days' written notice, terminate the employment of the Contractor and take possession of the premises and of all the materials, tools, and appliances, thereon and finish the work by whatever method he may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Contract price shall exceed the expense of finishing the work including compensation for additional managerial and administrative services, such excess shall be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor shall pay the difference to the Owner.

SECTION 26 - CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

If the work shall be stopped under any order of any court, or other public authority, for a period of three months, through no act or fault of the Contractor or anyone employed with him, or if the Owner should fail to pay the Contractor within fifteen (15) days any sum awarded by arbitrators or approved by the Owner's Representative, then the Contractor may, upon seven days' notice to the Owner, stop work or terminate this Contract and recover from the Owner payment for all work executed and any loss sustained upon any plant or materials and reasonable profit and damage.

SECTION 27 - PAYMENT TO CONTRACTORS

1. Application for payment. The Contractor shall submit to the Owner an application for each monthly payment, and, if required, receipts or other vouchers showing his payments for materials and labor including payments to subcontractors as required by Section 35 of the General Conditions.

2. Such applications shall be submitted between the first and the tenth day of each calendar month following the month in which the work is performed. The Contractor shall, before the first application, submit to the Owner a schedule of values of the various parts of the work, including quantities, aggregating the total sum of the Contract, divided so as to facilitate payments to Subcontractors in accordance with Section 35 made out in such form as the Owner requires, and, if required, supported by such evidence as to its correctness as the Owner may direct. This schedule when approved shall be used as a basis for monthly certificates of payment, unless it is found to be in error. In applying for payments, the Contractor shall submit a statement based upon this schedule, and, if required, itemized in such form and supported by evidence showing his right to the payment claimed. Attached to the General Conditions is a sample form of the Monthly Progress

Estimate which will be required by the Owner. This shows the form, style, and itemized procedure for submitting payment requests. The Owner will furnish to the Contractor all necessary blank forms. Six (6) copies of each submittal are required.

3. The Owner will pay the Contractor the amount of the approved application less 10% retained percentage within fifteen (15) days after receipt of each approved monthly payment request. The retained percentage shall be decreased from 10% to 5% after the job is 50% or more complete. The 50% complete refers only to labor and materials actually worked into the job, and does not include materials on hand.

4. If payments are made on account of materials delivered and suitably stored at the site but not incorporated in the work, they shall be conditional upon submission by the Contractor of bills of sale or such other procedures as will establish the Owner's title to such material or otherwise adequately protect the Owner's interest, and on such forms as shown on the sample payment request attached to the General Conditions.

5. Certificates of payment. No certificate issued or payment made to the Contractor, or partial or entire use or occupancy of the work by the Owner, shall be an acceptance of any work or materials not in accordance with this Contract. The making and acceptance of the final payment shall constitute a waiver of all claims by the Owner, other than those arising from unsettled liens, or under terms of SECTION 45, "GUARANTEES," from faulty work appearing after final payment or from requirement of the specifications, and of all claims by the Contractor, except those previously made and still unsettled.

6. If the Owner fails to pay the sum named in any certificate or in any award by arbitration, upon demand when due, the Contractor shall receive in addition to the sum named in the certificate interest thereon at the legal rate in force at the place of building.

7. Acceptance and final payment. Upon receipt of written notice from the Contractors that the building is ready for final inspection and acceptance, the Owner shall promptly make such inspection. If the final inspection reveals that any items of work have not been completed in accordance with the Contract, the Owner shall promptly furnish to the Contractor a written list thereof, and, upon completion of those deficient items, another inspection shall be made by the Owner. When the Owner finds the building acceptable under the Contract and the Contract fully performed, it shall promptly furnish to the Contractors a final certificate stating that the work provided for in the Contract has been completed and is accepted by it.

8. The final payment of five per cent (5%) shall be made sixty five (65) days after a final certificate has been issued stating that the work provided for in the Contract has been completed and accepted by the Owner; provided, however, that the Owner shall not be required to make such payment unless and until it is satisfied, through the furnishing of the Affidavit of Receipt and Release referred to in Section 32 - "Liens" of the General Conditions that all bills have been paid.

SECTION 28 - CONTRACTOR'S LIABILITY INSURANCE

The Contractor shall maintain such insurance as will protect him from claims under workmen's compensation acts and from any other claims for damages or personal injury, including death, which may arise from operations under this Contract, whether such operations be by himself or by any Subcontractor or anyone directly or indirectly employed by either of them, or by operations of the Owner. Certificates of such insurance shall be filed with the Owner and shall be subject to his approval for adequacy of protection.

SECTION 29 - OWNER'S LIABILITY INSURANCE

1. The Contractor shall not commence work under this contract until he has obtained a minimum of all the insurance required hereunder and such insurance has been approved by the Owner; nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar insurance required of the subcontractor has been so obtained and approved. Approval of the insurance by the Owner shall not relieve or decrease the liability of the Contractor hereunder. The cost of all such insurance shall be included in the bid amount.

   a. Workmen's Compensation and Employer's Liability insurance as required by statute. (See Section 28 of the General Conditions.)

   b. Comprehensive General Liability:

1. Bodily Injury	$250,000.00	each person
	$500,000.00	each occurrence
	$500,000.00	aggregate products (including complete operations)
2. Property Damage (Broad Form)	$100,000.00	each occurrence
	$300,000.00	aggregate operations
	$300,000.00	aggregate protective
	$300,000.00	aggregate products (including completed operations)
	$300,000.00	aggregate contractual

   c. Comprehensive Automobile Liability (Owner, Non-Owned and Hired Vehicles)

1. Bodily Injury	$100,000.00	each person
	$300,000.00	each occurrence
2. Property Damage	$100,000.00	each occurrence

   d. Owner's Protective Liability

1. Bodily Injury	$250,000.00	each person
	$500,000.00	each occurrence
2. Property Damage	$100,000.00	each occurrence
	$300,000.00	aggregate

Certificate of Insurance (original and one copy) shall be furnished to the Owner providing coverage as outlined. (Thirty-day written notice of cancellation shall be given to the Owner and the Architect, and such provision shall be included in the insurance policies and in the certificates of insurance.)

SECTION 30 - HOLD HARMLESS AGREEMENT

In addition to obtaining the foregoing insurance, the Contractor shall indemnify and save harmless the Owner from and against any and all liability, demands, causes of action, or claims thereof, whether well-founded or otherwise, including the cost of defending the same, for bodily injury to any person whomsoever (including employees of the Owner) or damage to property of any person in the course of or in connection with the operations by the Contractor under the Contract.

No subcontract shall relieve the Contractor of any of his liabilities or obligations under the Contract and the Contractor agrees that he is fully responsible to the Owner for acts and omissions of his subcontractors and of persons either directly or indirectly employed by them.

SECTION 31 - DAMAGES

1. If either party to this Contract shall suffer damage in any manner because of any wrongful act of neglect of the other party or of anyone employed by him, then he shall be reimbursed by the other party for such damage, including any agreed liquidated damages for failure to complete by the specified completion date.

2. Claims under this clause shall be made in writing to the party liable within a reasonable time at the first observance of such damage and not later than the time of final payment, except as expressly stipulated otherwise in the case of faulty work or materials.

SECTION 32 - LIENS

Neither the final payment nor any part of the 5% retained percentage shall become due until the Contractor shall deliver to the Owner a complete release of any and all liens arising out of this Contract. He shall also furnish an Affidavit of Receipt and Release of all obligations, which shall include (but not be limited to) all labor and material for which a lien could be filed as far as he has knowledge or information of them. In addition, an individual Affidavit of Receipt and Release shall also be furnished to the Owner by the Contractor from each individual subcontractor and material supplier. However, the Contractor may, if any subcontractor or material supplier refuses to furnish a release for receipt in full, furnish a bond satisfactory to the Owner to indemnify him against any lien. If any lien remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such a lien, including all costs and attorney's fees in a reasonable amount.

SECTION 33 - ASSIGNMENT

Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other, nor shall the Contractor assign any monies due or to become due to him hereunder, without the previous written consent of the Owner and the surety has been given due notice of such assignment in writing and has consented thereto in writing.

SECTION 34 - SEPARATE CONTRACT

The Owner reserves the right to let other contracts in connection with this work. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work, and shall properly connect and coordinate his work with theirs.

SECTION 35 - SUBCONTRACTORS

Each bidder shall be prepared, immediately following opening of all the proposals, to confer with the Owner's Representative and such other parties as the Owner's Representative may designate for the purpose of examining his proposal in detail, and to deliver to the Owner's Representative, a list of proposed subcontractors and the amount of their proposed subcontract prices used in his proposal. All Subcontractors are subject to the approval of the Owner's Representative. Where the bidder has determined his own prices for work he might subsequently elect to subcontract. The facts and reasons relating thereto shall be subject to appropriate discussion. All subcontracts shall be placed not later than 30 days after approval of subcontractors by the Owner.

SECTION 36 - RELATIONS OF CONTRACTOR AND SUBCONTRACTORS

1. The Contractor agrees to bind every Subcontractor and every Subcontractor agrees to be bound by the terms of all the Contract Documents as far as applicable to this work, including the following provisions of this Section, unless specifically noted to the contrary in a subcontract approved in writing by the Owner.

2. The Subcontractor agrees:

    a. To be bound to the Contractor by the terms of all the Contract Documents and to assume toward him all obligations and responsibilities that he, by those documents assumes toward the Owner.

    b. To submit to the Contractor applications for payment in such reasonable time as to enable the Contractor to apply for payment as covered in the Contract Documents.

    c. To make all claims for extras, for extensions of time and for damages, for delays or otherwise, to the Contractor in the manner provided in the General Conditions for like claims by the Contractor upon the Owner, except that the time for making claims for extra cost is one week.

3. The Contractor agrees:

   a. To be bound to the Subcontractor by all the obligations that the Owner assumes to the Contractor under the Contract Documents and by all the provisions thereof affording remedies and redress to the Contractor from the Owner.

   b. To pay the Subcontractor, upon the payment of certificates, if issued under the schedule of values described in the General Conditions, the amount allowed to the Contractor on account of the Subcontractor's work to the extent of the Subcontractor's interest therein.

   c. To pay the Subcontractor, upon the payment of certificates, if issued otherwise than as in (e) so that at all times his total payments shall be as large in proportion to the value of the work done by him as the total amount certified to the Contractor is to the value of the work done by him.

   d. To pay the Subcontractor to such an extent as may be provided by the Contract Documents or the subcontract, if either of these provided for earlier or larger payments than the above.

   e. To pay the Subcontractor on demand for his work and materials as far as executed and fixed in place, less the retained percentage, at the time the certificate should issue, even though the proper authority fails to issue it for any cause not the fault of the Subcontractor.

   f. To pay the Subcontractor a just share of any fire insurance money received by him, the Contractor.

   g. To make no demand for liquidated damages or penalty for delay, in any sum in excess of such amount as may be specifically named in the subcontract.

   h. That no claim for service rendered or materials furnished by the Contractor to the Subcontractor shall be valid unless written notice thereof is given by the Contractor to the Subcontractor during the first ten days of the calendar month following that in which the claim originated.

   i. To give the Subcontractor an opportunity to be present and to submit evidence in any arbitration involving his rights.

   j. To name as arbitrator under arbitration proceedings as provided in the General Conditions the person nominated by the Subcontractor, if the sole cause of dispute is the work, materials, rights or responsibilities of the Subcontractor; or, if of the Subcontractor and any other Subcontractor jointly, to name as such arbitrator the person upon whom they agree.

4. The Contractor and Subcontractor agree that:

   a. In the matter of arbitration, their rights, obligations and all procedure shall be analogous to those set forth in the Contract.

   b. Nothing in this paragraph shall create any obligation on the part of the Owner to pay or see to the payment of any sums to any Sub-Contractor.

SECTION 37 - STATUS AND RESPONSIBILITY OF OWNER'S REPRESENTATIVE

1. The Owner's Representative shall have general supervision and direction of the work. He is the agent of the Owner on the site, and shall have the advisory and consultive services of the Architect available at all times.

2. He shall have the responsibility of enforcing the performance of the Contract and shall permit no changes in the conditions thereof without proper procedure as outlined in Section 18, Changes in the Work.

3. All instructions, directions, or other information will be given to the Contractor by the Owner's Representative or his authorized agent except as outlined in Section 38, Architect's Status and Decisions, and Section 7, Shop Drawings.

4. In general, the Owner's Representative shall have the following responsibilities:

   a. He shall have the authority to stop the work whenever such stoppage may be necessary to insure the proper execution of the Contract. This shall include the stoppage of any work that is being improperly installed and he may demand that any incompetent workman be taken off the job and another man substituted.

   b. He shall serve as interpreter of the conditions of the Contract subject to the review of his decisions or interpretations by the Architect as outlined in Section 38, Architect's Status and Decisions.

   c. He shall serve as judge of the performance of the Contract with power to enforce faithful performance subject to a review of his decision or interpretation by the Architect as outlined in Section 38, Architect's Status and Decisions.

   d. He shall exercise all functions normally performed by a Clerk-of-the-Works.

SECTION 38 - ARCHITECT'S STATUS AND DECISIONS

1. The Architect's supervisory and administrative authority shall be exercised through the Owner's Representative, except as otherwise provided in the Contract Documents.

2. In his capacity as author of the Contract Documents, the Architect shall be interpreter of the Conditions of the Contract and judge of its performance. As such, he shall side neither with the Owner nor the Contractor, but shall use his powers under the Contract to enforce its faithful performance by both.

3. In general, the Architect's responsibilities shall include the following:

   a. Approval of all shop drawings.

   b. Serve as interpreter of the Conditions of the Contract Documents in the event that the Contractor takes exception to interpretations or decisions of the Owner's Representative.

4. All the Architect's decisions are subject to arbitration.

5. If the Architect fails to render a decision within ten days after the parties have presented their evidence, either party may then demand arbitration. If the Architect renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence but shall not disturb or interrupt such proceedings except where such decision is acceptable to the parties concerned.

SECTION 39 - ARBITRATION

1. All disputes, claims or questions subject to arbitration under this Contract shall be submitted to arbitration in accordance with provisions, then obtaining, of the Standard Form of Arbitration Procedure of the American Institute of Architects, and this agreement shall be specifically enforceable under the prevailing arbitration law, and judgment upon the award rendered may be entered in the highest court of the forum, State of Federal, having jurisdiction. It is mutually agreed that the decision of the arbitrators shall be a condition precedent to any right of legal action that either party may have against the other.

2. The Contractor shall not cause a delay of the work during any arbitration proceeding, except by agreement with the Owner.

3. Notice of the demand for arbitration of a dispute shall be filed in writing with the Architect and the other party to the Contract. If the arbitration is an appeal from the Architect's decision, the demand therefore shall be made within ten days of its receipt; in any case the demand for arbitration shall be made within a reasonable time of final payment, except as otherwise expressly stipulated in the Contract.

4. The arbitrators, if they deem that the case require it, are authorized to award to the party whose contention is sustained, such sums as they or a majority of them shall deem proper to compensate it for the time and ex pense incident to the proceeding and, if the arbitration was demanded without reasonable cause, they may also award damages for delay. The arbitrators shall fix their own compensation, unless otherwise provided by agreement, and shall assess the costs and charges of the proceeding upon either or both parties.

SECTION 40 - CASH ALLOWANCES

The Contractor shall include in the Contract sum all allowances named in the Contract Documents and shall perform the work so covered for such sums as the Owner's Representative may direct, the Contract sum being adjusted in conformity therewith. The Contractor declares that the Contract sum includes such sums for labor and installation, storage and handling at the job site, and other expenses and profit on account of cash allowances as he deems proper. No demand for expenses or profit other than those included in the Contract sum shall be allowed. The Contractor shall not be required to employ for any such work persons against whom he has a reasonable objection.

SECTION 41 - USE OF PREMISES

1. The Contractor shall confine his apparatus, the storage of materials, and the operations of his workmen to limits indicated by law, ordinances, permits or directions of the Owner's Representative, and shall not unreasonably encumber the premises with his materials.

2. The Contractor shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety.

3. The Contractor shall enforce the Owner's Representative's instructions regarding signs, advertisements, fires, smoking, and parking.

4. Arrange and maintain materials in an orderly manner with use of walks, drives, roads, entrances, and keep them unencumbered.

5. Provide and maintain on premises where directed, water-tight storage shed or sheds, for storage of materials which may be damaged by weather. Provide such sheds with wood floors, raised above ground.

6. Allot space to Subcontractors for storage of their materials and for erection of their sheds and tool houses.

7. Confine storage of materials to spaces designated.

8. Should it be necessary at any time to move materials, sheds, storage platforms, move same as and when directed, without extra cost to Owner.

9. Store cement, lime and other materials affected by moisture, on platforms, and protect them from the weather.

SECTION 42 - CUTTING, PATCHING AND DIGGING

1. The Contractor shall do all cutting, fitting or patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by work of other contractors shown upon, or reasonably implied by, the Drawings and Specifications for the completed structure, and he shall make good after them as the Owner may direct.

2. Any cost caused by defective or ill-timed work shall be borne by the party responsible therefor.

3. The Contractor shall not endanger any work by cutting, digging or otherwise and shall not cut or alter the work of any other Contractor save with the written consent of the Owner's Representative.

4. The Contractor shall be held responsible for and shall pay the cost of excessive cutting in the work of other Contractors, when said cutting results from requirements which could have been reasonably foreseen and provided for without undue expense.

SECTION 43 - CLEANING UP

1. The Contractor shall at all times keep the premises free from accumulation of waste material or rubbish caused by his employees or work. At the completion of the work he shall remove all his rubbish from and about the project and all his tools, scaffolding and surplus materials and shall leave his work "broom clean" or its equivalent, unless more exactly specified. Should the Contractor be negligent in this respect or in maintaining the project free from waste material or rubbish during the entire course of construction, the Owner reserves the right to use his own forces for such clean-up, the cost of which will be back charged against the Contractor. In case of dispute the Owner may remove the rubbish and charge the cost to the several contractors as the Architect shall determine to be just.

2. In addition to the general broom cleaning, the Contractor shall be responsible for the following special cleaning at the completion of the work:

   a. Cleaning of all glass: The Contractor shall remove stickers, putty stains and paint from all glass and shall wash and polish same. Care shall be taken not to scratch glass.

   b. Cleaning of all painted, decorated and stained work: The Contractor shall remove all marks, stains, fingerprints and other soil or dirt from all painted, decorated and stained work caused by the conduct of his own work. Any cleaning necessary as a result of any Subcontractor's work shall be performed by the responsible Subcontractor, or performed by this Contractor at the expense of the responsible Subcontractor, as the responsible Subcontractor may elect.

   c. Cleaning and polishing of all hardware: The Contractor shall clean and polish all hardware for all trades; this shall include removal of all stains, dust, dirt, paint, etc., upon completion.

   d. Removal of all spots, soil, and paint from all tile work: The Contractor shall remove all spots, soil, and paint from all tile work and shall wash same upon completion.

e. Rake the site with a hand rake removing all debris.

f. The Contractor shall be responsible for removing or having removed all company trade marks or product names or any markings that are not to remain on any materials and/or equipment permanently installed on the project either by himself or his Subcontractor.

3. Throwing rubbish to the ground from the window, and other parts of the building, is to be avoided.

SECTION 44 - MISCELLANEOUS SERVICES BY THE CONTRACTOR

1. Batter Boards and Bench Marks: These shall be carried from the base references, established by the Owner, to the building and from floor to floor as the structure rises, by the Contractor.

2. Temporary Enclosures: Temporary enclosures, barricades, signs, etc., needed for the general protection of the structure shall be provided by the Contractor.

3. Temporary Heat: The Contractor shall provide all temporary local heating required to perform or protect all of his work during cold weather. Open fires or salamanders shall not be used within the buildings.

   a. For work performed following the placement of the permanent heating system, heat may be utilized from the building heating plant for the purpose of providing heat during construction, providing heat is available from the Owner's facilities as determined by the Owner. All materials and labor necessary to provide such heat from the permanent heating system shall be furnished by the Contractor at his expense, who shall maintain same in service. (1) The Contractor shall reimburse the Owner for the heat used at $1.00 per million B.T.U.'s.

   b. The provision that temporary heat may be supplied from the permanent system shall not relieve any Contractor of the responsibility to fully protect his own work against damage from extreme cold and freezing. Adequate protection shall be maintained at all times either from the temporary system outlined above or by means of other heating devices having the approval of the Owner's Representative. Any damage to the structure resulting from the installation or a Contractor's failure otherwise to protect his own work against cold or freezing shall be made good at that Contractor's expense.

4. Temporary stairs, ladders, etc.:

   a. The Contractor shall furnish as directed by the Owner's Representative, at a central position in the structure a substantial temporary wood stairway, complying in every respect with the Utah State Safety Code for such a structure.

b. This stair is to be provided and maintained by the Contractor for the use of all Subcontractors and others performing work on the structure. The stair shall be removed by the Contractor when in the opinion of the Owner's Representative the permanent stairways are available for use.

c. All ladders, ramps, scaffolds, hoists, runways, derricks, chutes, temporary elevators, etc., required by the individual prime or Subcontractors, tradesmen, or others for the proper execution of their work shall be provided and maintained by that person or company. This shall not prohibit cooperative action among the various working groups on the structure in the multiple usage of any such facilities, but all arrangements shall be the responsibility of the individual tradesmen or contractors on the site. All such temporary facilities shall conform to requirements of the Utah State Safety Code.

5. Temporary Toilets:

a. At the location approved by the Owner's Representative, the General Contractor shall provide a temporary building to satisfactorily serve as a workmen's toilet room. This building shall remain the property of the Contractor and shall be removed at the completion of the work.

b. This space shall be sufficiently large to permit the installtion of one water closet, one urinal, and one lavatory which shall be furnished and installed by the plumbing and heating Contractor. This building may be contiguous to or separate from the field office, but in any case shall be so equipped with temporary heat that fixtures will be prevented from freezing during the winter weather.

c. The General Contractor shall keep the toilet room clean, neat, and in first-class condition at all times. He shall also maintain all plumbing equipment in first-class condition.

6. Watchmen: The Contractor shall provide at his expense for such watchmen as may be necessary to protect the work. The General Contractor shall not be required to furnish a night watchman during the time when he or his foreman is present, but the Contractor will be held responsible for any loss of material or damage done to the premises at any time during the construction period.

7. Removal of temporary work: Remove temporary work from premises, on or before completion of work.

8. Temporary Roadways.

a. Construct and maintain temporary roadways within and adjacent to the site, in order to provide proper access to the structures.

b. Temporary roadways shall be constructed to adequately sustain and support all loads to be carried on them so as not to endanger existing or newly constructed underground or surface installations.

SECTION 45 - GUARANTEES

Where guarantees are required by these Specifications, the Contractor shall secure such warrantees from the materials supply company, Subcontractor, or other responsible party and deliver said copies to the Owner upon completion of the work.

SECTION 46 - GRADES, LINES, LEVELS AND LAYOUT

1. The Owner shall establish base lines and bench marks at convenient points about the project. From this basic data the Contractor shall lay out the structure as shown on the drawings or as directed. Any errors or inconsistencies in grades, lines, levels, or dimensions shall be reported to the Owner's Representative and proper adjustments thereof made before work is commenced.

2. Structure locations and elevations shall be established by the Contractor, but must be verified by the Owner's Representative in writing before proceeding with construction.

3. Levels shall be established on each floor by the Contractor for the use of others. Each Subcontractor or trade shall verify these levels as well as all dimensions, grades and lines as such may affect his work, and report any errors or discrepancies therein to the Owner's Representative who will reconcile the same before work continues.

4. As the work progresses, the Contractor shall lay out on the forms, or rough floors, the exact locations of all partitions as a guide to all trades. Other Contractors and all trades providing work which is to be placed in connection with walls and/or partitions shall check such locations and immediately notify the Owner's Representative of any conflicts in structure or changes necessary to accommodate services, utility lines or equipment required by the Drawings or Specifications. Contractors and others failing to make such check and give notice as outlined above shall be required to assume any costs resulting from their failure to do so.

SECTION 47 - EXISTING SITE CONDITIONS

The Contractor shall examine the site and the area adjacent to the site and become familiar with all existing structures, utilities, and other facilities that are to remain. He shall repair any of these which are damaged by his operation to the standards of workmanship and materials as set forth in the detailed Specifications for comparable work.

SECTION 48 - MANUFACTURER'S DIRECTIONS

1. All manufactured items, articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the Manufacturers, unless therein specified to the contrary.

2. At the termination of the work, the Contractor shall submit three complete sets bound in the best grade, hard-backed binder of all operating and maintenance instructions presenting full details for care and maintenance of all visible surfaces and all mechanical and electrical equipment installed. The sets shall include the following information:

   a. Complete description of items including catalog numbers.

   b. Complete parts list for each item.

   c. Name and address of local supplier.

   d. Name and address of manufacturer.

   e. Complete operating instructions.

   f. Complete maintenance instructions.

SECTION 49 - LOCAL BUILDING CODES

1. The Contractor represents that he is familiar or will become familiar with local building codes of Provo City, Utah County, and the State of Utah, and agrees that he will work with the Architect to be certain that the requirements of local building codes are met.

2. Contractor further agrees that if any work is installed without compliance with local building codes, and must for that reason be replaced, the Contractor will replace the same without any extra cost to or claim against the Owner.

SECTION 50 - OCCUPANCY BEFORE COMPLETION

1. If the work has not been completed by the Contractor within the time provided for therein, or any authorized written extension thereof, the Owner may, if Owner electes, occupy and use all buildings which have been completed and may also, if Owner elects, occupy any uncompleted building. By such occupancy the Owner does not accept the work as being complete nor the quality of the work, nor shall such an occupancy waive the Owner's claim for liquidated damages, nor shall such occupancy before completion entitle the Contractor to any extra fee for extra expense incurred by the Contractor in completing the work while the structures are being occupied.

2. In the event the Owner desires to occupy a building before completion, the Owner will present the Contractor a check list of items as yet uncompleted and upon completion of the work covered by such check list, Owner will accept the building. The presentation of the check list is to guarantee the Contractor against having to redo, repair, or replace work that may be damaged or destroyed through occupancy. In the event the Contractor is on schedule as to time of completion, and the Owner desires to occupy any structure, Owner may do so, if Owner so elects, but in such an event the Owner will:

   a. Present to Contractor a check list of items yet to be completed, and on completion of the work covered by the check list, the Owner will accept the building.

   b. If the Contractor will be put to extra expense by reason of the Owner's occupancy of the building prior to the completion date fixed hereby, Owner and Contractor will agree at the time the check list is presented, and prior to occupancy by the Owner as to the amount which should be allowed by reason of said extra expense, and in the event they cannot agree, the matter will be submitted to arbitration. Upon the reaching of an agreement as to the amount of the extra expense or upon agreement to submit the matter to arbitration, the Owner may forthwith occupy the building.

   c. Occupancy of the building beofre completion shall not be an acceptance of the work, nor shall it operate to extend the date of completion, except to the extent that the parties agree upon at the time the check list is presented or to the extent the time is fixed by arbitration if the parties cannot agree.

   d. The Owner shall not waive liquidated damages if the building is not completed within the time fixed by the Contract, and any additional time allowed for or on account of the early occupancy by the Owner.

SECTION 51 - WORK BY OTHERS

No claim for damages will be asserted by Contractor against Owner for delays caused by other Contractors to whom work may have been awarded hereunder by the Owner. If Contractor contends or asserts that his work is being held up by other Contractors in completing their work on a timely and orderly basis, Contractor will not be allowed any extra time for completing his work hereunder unless these delays are brought to the attention of the Owner by notice in writing, which notice shall identify the name of the Contractor or Contractors whose work is interfering with performance hereunder and shall describe the nature of the interference. Upon receipt of said notice, the Owner and the Contractor shall endeavor to agree as to whether extra time should be allowed on account of such interference or delays, and in the event they cannot agree, the extra time to be allowed, if any, shall be determined by arbitration; provided, however, that the arbiter will not award, in any event, any extra time for delays occurring prior to the time that Contractor hereunder has served written notice on the Owner of the existence of such delay and the cause thereof. No such extension shall be made for delay occurring more than seven (7) days before claim therefor is made in writing to the Owner. In the case of a continuing cause of delay, only one claim is necessary.

SECTION 52 - STRIKES AND LOCKOUTS

Owner will accept no responsibility for any expenses caused to Contractor by strikes or lockouts, either on the part of the Contractor or its employees, or Owner and its employees.

SECTION 53 - PERMANENT UTILITIES

The utilities serving the structure are attached to the various services furnished by others. The Owner shall furnish to the Contractor the locations and elevations of sewers, water lines, electrical services, etc., at the points where connections are to be made.

SECTION 54 - TEMPORARY FACILITIES

1. Utilities: The Contractor shall make all arrangements with the proper authority (state, county, city, Owner, etc.) for all utilities required by the Contractor during the construction period. The Contractor shall bear all costs for these utilities until final acceptance by the Owner. This shall include costs for installation of all equipment, meters, lines, etc., for the utilization of said utilities. The method of metering, connections, etc., must have the written approval of the body furnishing the utility to the Contractor. The Contractor shall be responsible for all utilities needed for his use during the entire construction period.

2. If utility service is available from the Owner's permanent utilities, the Contractor may, by making proper arrangements with the Owner and paying for all costs, use these permanent utilities. The Owner at no time assumes any responsibility for damage caused by the Contractor using any of the Owner's utilities due to interruption or discontinuation of services by the Owner, regardless of cause.

3. The Contractor shall pay the body furnishing the utilities the stipulated rates for said utilities for the entire construction period (until the final acceptance of the project by the Owner.).

4. If utility service is available from the Owner, then these established rates will apply:

   Electricity -- $0.02 per kilowatt hour
   Heat -- $1.00 per million B.T.U.

5. Temporary Offices: The Contractor shall maintain an office on project site. The Contractor shall install a telephone in his office and shall maintain it until final completion of the Contract. The Owner's Representative and the Architect shall have free and unrestricted use of this telephone for local calls in connection with this job. The telephone shall be equipped with one large extension gong centrally located. The cost of installation and all charges for the use of the telephone shall be paid by the General Contractor. The telephone shall not be a "pay station" type. Incoming calls shall be promptly answered during working hours.

SECTION 55 - "AS BUILT" PLANS

1. The Owner will furnish the Contractor with one set of ozalid prints of all drawings which are a part of this Contract. The Contractor shall maintain this set of prints in good condition in his field office and immediately upon the installation of any work in locations or in a manner other than shown on the drawings, the Contractor shall indicate such changes on the drawings. Dimension shall be given to permanent objects such as building columns, buildings, sidewalks, curbs and driveways, and/or grids.

2. Whenever necessary to complete the record drawings in a neat, legible manner, the Contractor shall employ a competent draftsman satisfactory to the Owner's Representative to make new drawings or to indicate changes on the prints.

3. On or before the date of final inspection, the Contractor shall deliver the corrected and completed prints to the Architect to air him in completing "as-built" drawings. Delivery of the prints to the Architect will not relieve the Contractor of the responsibility of furnishing required information that may be omitted from the prints. Delivery of the prints must be made before payment of the final 5% retained percentage.

SECTION 56 - FIRE INSURANCE

1. The Contractor shall take out and maintain a Fire Insurance Extended coverage and vandalism policy on the building and the materials stored in connection therewith or adjacent thereto and intended for use in the building. The loss, if any, to be made payable to the Owner and the Contractor as their respective interests may appear. It shall be understood, however, that this policy shall not include coverage on any tools owned by mechanics; any tools, equipment, scaffolding, stagings, towers and forms owned or rented by the Contractor, the capital value of which is not included in the cost of the work.

2. The essential elements of the policy shall include the following:

Name of Insured:	Corporation of the President, Church of Jesus Christ of Latter-day Saints.
Property Insured:	Name of Property to be Filled In.
Policy Period:	From date of policy acceptance to completion and acceptance of building.
Insurance Amount:	The total cost of the work, based on the General Contract amount with applicable adjustments for Change Orders.

Insurance Coverage: The actual cash value of repairs or replacement of property damaged or destroyed with material of like kind and quality due to any of the following causes:

a. Direct loss by fire. This is to include water damage caused by fire fighting operations.

b. Loss due to lightening.

c. Loss due to windstorm, hail explosion, riot, riot attending a strike, civil commotion, aircraft, vehicles and smoke.

d. Direct loss due to vandalism and malicious mischief.

e. Glass breakage caused by any of the above, and/or accidents or carelessness during contstruction period.

3. Hazards not included in policy:

   a. Nuclear reaction, nuclear radiation or radioactive contamination.

   b. Direct or indirect war risks.

4. Requirements in case of loss:

   a. Insured to give immediate written notice to Company.

   b. Insured to make all practical efforts to protect property from further loss.

   c. Company to immediately join with insured Representative in examining damages.

   d. Company to pay the total cost of repairing or replacing all damaged property with materials of like kind and quality by one of the following methods:

      (1) The Company to manage the repair and replacement program in accordance to the project plans, specifications and General Conditions of the construction Contract.

      (2) The Company to authorize the insured to manage the repair and replacement program in accordance with the project plans, Specifications and General Conditions of the Contract.

5. Repairs and replacements to be made at the earliest practical date.

SECTION 57 - BONDS

The Contractor shall furnish a 100% Performance Bond and a 100% Labor and Material Payment Bond in the form enclosed in these Specifications. The Contractor's bid shall include the cost of both bonds each in the amount of 100% of his bid price.

SECTION 58 - MATERIALS

1. The Bidder's proposal shall be in strict conformity with the Drawings and Specifications; however, at the time of the bid opening and attached to the Bidders' proposal, unless otherwise specified, the Contractor may offer to the Owner's Representative a substitute for any material, apparatus, equipment, or process indicated or specified by name.
2. On demand of the Owner's Representative, the Architect, or the Structural Engineer, the Contractor at his own expense shall furnish information or data concerning the material, apparatus, equipment or process offered him as equal to, and as a substitute for, that indicated or specified by name; and if the Owner's Representative, the Architect, or the Structural Engineer shall so require, the Contractor at his own expense shall have the said material, apparatus, equipment or process tested under the direction of the Owner's Representative, the Architect, or the Structural Engineer as to its quality and strength, its physical, chemical, and/or other characteristics, its durability, finish, and/or efficiency, by an approved testing laboratory.
3. The low Bidder will be determines on the base bid only and substitutions will not be considered in the determination as to who is the low Bidder.
4. The Contract will be signed on the basis of the base bid without reference to substitutes. The acceptance, if any, of substitutes will be handled by Change Order.

SECTION 59 - TAXES

The Contractor shall include in his bid the cost of Social Security, Unemployment Compensation, sales, use, and any other taxes as may be required by State, Municipal, and Federal laws.

SECTION 60 - REFUSE

Refuse barrels shall be provided by the Contractor for workmen's lunch boxes and papers. The project shall be kept clean. Burn refuse as often as is necessary to keep project clean.

SECTION 61 - FIRE HYDRANTS

The Contractor may use water from the fire hydrants only with the express permission of the Owner's Representative. If permission is granted, the

Contractor must meet the following conditions:

1. Always use a standard hydrant and spanner wrench, never a pipe wrench. (Wrenches are available at Pacific States Cast Iron Pipe Company for $3.00 each.)

2. Always use a gate valve to regulate the amount of water needed. The hydrant valve should be in the clear open position in order that rocks will not lodge in the valve making it inoperable.

3. Never force a coupling thread which is not National Standard 2 1/2 in., 7 1/2 threads to the inch. Any other size will damage the bronze nozzle threads.

4. Always disconnect hose at the end of the working day in order that the hydrant will be ready for use in an emergency.

5. Always replace the hose nozzle caps after use to prevent the dropping of rocks or other items down the hydrant barrel.

SECTION 62 - COORDINATION OF WORK

1. Before award of the Contract, this Contractor shall compare these Specifications and the accompanying Drawings with the Drawings and Specifications for electrical, plumbing, heating, ventilation, and air conditioning, and if there are any discrepancies between them, shall report the same to the Owner's Representative, and obtain from him written instructions for changes necessary.

2. The Architectural Drawings shall take precedence over the other drawings and shall govern in all cases where discrepancies occur, unless such discrepancies are adjusted before the awarding of the Contract.

3. Each Contractor shall work and cooperate with the other Contractors in installing work which may affect their work. Before installation, they will make proper provision to avoid interferences, in a manner approved by the Owner's Representative. All changes in the work of this Contractor caused by his neglect to do so shall be made by him at his own expense.

SECTION 63 - GLASS BREAKAGE

The General Contractor is responsible for glass damaged or broken or putty disturbed during time of construction. Leave glass whole, free from scratches or rattle at time of final acceptance.

SECTION 64 - ELEVATOR MAINTENANCE

If the elevators are used during the construction of the building, the General Contractor must assume total responsibility and also assume the cost of monthly service to the equipment, by the elevator contractor, Division 18, of this Specification. This responsibility and all operating costs shall be assumed up to the date of the Owner's acceptance of the building and the elevators.

SECTION 65 - DOMESTIC STEEL

No reinforcing, structural or other steel not manufactured in the United States of America shall be used in this project.

BRIGHAM YOUNG UNIVERSITY

Provo, Utah

PROGRESS ESTIMATE

Date ....

Estimate No. ....

Period From.................... to....................

Project ....

Project No. ....

Contract ....

PAYABLE TO ....

....

....

ITEM NO.	DESCRIPTION	UNITS	% CONT. QUANTITY	CONTRACT BID PRICE	QUANTITY THIS ESTIMATE	AMOUNT THIS ESTIMATE	QUANTITY TO DATE	AMOUNT TO DATE

Comments ....

....

Amount Allowed to Date

Amount Allowed for Material on Hand

Gross Amount Allowed to Date

Less Retained Reserve

Less Other Deductions

Net Amount Allowed to Date

Less Previous Payments

Net Payment This Estimate

APPROVED:

Owner's Representative

By..............................

Contractor

By..............................

DIVISION 3

UTILITY PAINTING AND IDENTIFICATION SYSTEM

SECTION 1 - SCOPE OF WORK

1. This Division shall be subject to shop drawing procedure as outlined in Section 7 of the Brigham Young University Specification General Conditions.

2. In all accessible areas, except pipe chases and above furred ceiling, all exposed pipes, conduits, valves, mechanical and electrical equipment shall be painted a color which will harmonize with the surroundings. See Basic Requirements for High Temperature Water Distribution Systems, Section 10, Division 4, of this compilation for color schedule in High Temperature Water Equipment Rooms.

3. In all accessible areas all pipes, conduits, valves, mechanical and electrical equipment shall be identified by stenciled name, tag, and/or sign. Brief operating and maintenance instructions, directional flow arrows, and any other helpful information shall also be securely posted on or near equipment in a position which can easily be seen and read.

SECTION 2 - INFORMATION FOR IDENTIFICATION

1. The Architect shall provide the Contractor with a list of types of items to be identified, along with an example of each type of tag or sign. From this list the Contractor shall prepare and submit to the Architect and the Owner, for their approval, a detailed list including all valves, ducts, mechanical and electrical equipment, etc. with the inscription to be placed on each tag or sign.

SECTION 3 - PIPE IDENTIFICATION

1. A directional flow arrow and a stenciled name identifying the pipe contents shall be painted on the pipe adjacent to each valve, each branch or take-off, each point a pipe leaves or enters a wall, every major change in direction of a pipe, each expansion joint, and each anchor. At branches or take-off points the destination or area served shall also be stenciled on the pipe.

2. Stencil letters and flow arrows shall be 1/2", 7/8", or 1-3/4" in height, depending on the size of the pipe or equipment. In all cases the largest size practicable shall be used.

3. Abbreviations for identification shall comply with, but not limited to, the following:

TYPE OF UTILITY	ABBREVIATION
Hot Water (culinary use)	Cul. Hot Water
Cold Water (culinary use)	Cul. Cold Water
Chilled Water Supply	Chilled Water Supply
Chilled Water Return	Chilled Water Return
Condensing Water Supply	Condensing Water Supply
Condensing Water Return	Condensing Water Return
Distilled Water	Dist. Water
High Pressure Steam Supply (Note max. pressure)	H. P. Steam (Pressure)
Low Pressure Steam Supply (Note max. pressure)	L. P. Steam (Pressure)
Steam Condensate Return Pipe	Return Condensate
High Temperature Water Flow	H. T. W. F. (400 Psig. 410°F.)
High Temperature Water Return	H. T. W. R. (400 Psig.)
Hot Water Radiation Supply	Hot Water Radiation Supply
Hot Water Radiation Return	Hot Water Radiation Return
Snow Melting System (Medium -oil, anti-freeze, etc.)	Snow Melting (Medium)
Roof Drains	Roof Drains
Gas Pipes	Gas
Compressed Air (Exclusive of pneumatic control lines)	Comp. Air (Pressure)
Electric Conduit High Voltage (Note voltage, conductor size and phase)	High Voltage (note voltage, conductor size and phase)

SECTION 4 - VALVE IDENTIFICATION

1. All valves, regardless of size, shall be identified with brass tags of .051 thickness, 1 inch by 3 inches or larger, with 1/8-inch high stamped letters. The tag shall be attached to valves with rustproof key chains. Information on tag shall include function of valve and any other pertinent data. Abbreviations as shown in Section 3, Paragraph 3, shall be used as applicable.

SECTION 5 - DUCT IDENTIFICATION

1. Ductwork shall be identified at or near the fan with stenciled signs or by engraved laminated plastic signs secured by rustproof screws. Sign shall show area served.

SECTION 6 - EQUIPMENT IDENTIFICATION

1. Equipment including the following: electrical panels, electric motors, gauges, meters, mechanical and electrical equipment, and all other devices, shall be identified with signs made of laminated plastic with 1/8 inch or larger engraved letters. Signs shall be securely attached by rustproof screws or some other permanent means. Information on sign shall include name of equipment, rating, maintenance instruction, and any other important data.

SECTION 7 - HIGH VOLTAGE MAIN FEEDERS IDENTIFICATION

1. All high voltage conductors shall be identified at all termination points or junction boxes with plastic or fiber tags attached with waxed linen cord. Lettering on the tag shall be made with a wax pencil, covered with one coat of spray lacquer. Information on the tag shall include voltage, conductor size, phase, source, and/or destination of conductor.

SECTION 8 - LOW VOLTAGE MAIN FEEDERS IDENTIFICATION

1. All low voltage main feeders shall be identified inside the branch multi-breaker box with plastic or fiber tags attached with waxed linen cord. Information on the tag shall include voltage, conductor size, and location (room number) of main switch.

SECTION 9 - COMMUNICATION SYSTEM IDENTIFICATION

1. Conductors for bells, clocks, intercommunication systems, and alarm circuits shall be identified at all junction or terminal blocks with plastic or fiber tags attached with waxed linen cord. Lettering on the tag shall be made with a wax pencil, covered with one coat of spray lacquer. Information on the tag shall include name of circuit and area served.

SECTION 10 - PAINT SPECIFICATIONS

1. All surfaces to be painted shall be prepared in accordance with the detailed painting specifications in another part of these specifications. Surfaces that are not subjected to temperatures higher than 190°F. shall be painted with paint as specified for the area in which they are located. Pipes, valves, or other equipment subjected to temperatures above 190° F. shall be painted with heat resisting black enamel or heat resisting aluminum paint as specified below. Architect shall designate surfaces to be painted aluminum and surfaces to be painted black. All pipe and equipment shall be painted at least three coats. Color shall be specified by Architect. See Division 4, Basic Requirements for High Temperature Water Distribution Systems, for color schedule in High Temperature Water Equipment Rooms.

   a. Heat resisting black enamel suitable for use at temperatures of at least 450° F. shall be Sta-Black Enamel as manufactured by Pratt and Lambert Company, or Ebonite Boiler and Stack Paint as manufactured by W. P. Fuller and Company.

   b. Heat resisting aluminum paint shall be Crest-Lite Synchrome Aluminum paint as manufactured by Crescent Bronze Powder Company, or a Valdura Company product suitable for temperatures of at least 450° F. All H. T. W. uninsulated surfaces shall be painted with materials manufactured by companies listed above suitable for temperatures up to 750° F.

DIVISION 4

BRIGHAM YOUNG UNIVERSITY

BASIC REQUIREMENTS FOR HIGH TEMPERATURE WATER DISTRIBUTION SYSTEMS

Subject	Section
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LOW PRESSURE PIPING	4
WELDERS AND WELDING	4
VALVES	5
TEST AND WASHING PIPES	6
INSULATION	7
UNDERGROUND CONDUIT	7
H. T. W. EQUIPMENT ROOMS	8
EQUIPMENT ROOM ACCESSORIES	9
PAINTING	10
H. T. W. STEAM GENERATORS	11
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REVISION DATES

July 1960, February 1961, October 1961, March 1962, July 1962,
June 1963, June 1964, October 1964, February 1968, July 1968

BRIGHAM YOUNG UNIVERSITY

BASIC REQUIREMENTS FOR HIGH TEMPERATURE WATER DISTRIBUTION SYSTEMS

Section 1. INTRODUCTION

1. The extension to the high temperature water system and the new high temperature water conversion rooms and vaults shall be designed in accordance with the general specifications contained in this division of the INSTRUCTIONS TO ARCHITECTS AND ENGINEERS.

2. NOTE to Architects and Engineers

   These specifications may be used as written. Small changes may be necessary for the respective application and function.

3. There shall be a division in all future mechanical construction specifications detailing the high temperature water extensions. All specifications for high temperature water contracts shall be contained in this division and printed on blue paper contrasting in color from all other divisions.

Section 2. SCOPE OF WORK

1. Work of this division of the specifications consists of furnishing all labor, equipment, methods, and materials and performing all operations for extension of existing high temperature water distribution systems and installation of heat exchange equipment, in accordance with the Engineer's specifications and applicable drawings.

2. Typical work to be performed includes the following:

   a. Extend high temperature water distribution piping from the existing heat source to the future conversion room. Work shall include pipe, fittings, anchors, pipe supports, insulation, and insulating conduits.

   b. Placement of all H. T. W. equipment and pipe supports.

   c. Pipe and equipment insulation.

   d. Drains, ventilation, and facilities for conversion rooms.

   e. Painting and identification of all equipment, piping, insulation, and structure.

3. The mechanical drawings shall show the general arrangement of all piping, equipment, etc., and shall be followed as closely as actual building construction and the work of other trades will permit. The architectural and structural drawings shall be considered as a part of the specifications insofar as these drawings furnish the Contractor with information relating to design and construction of the facilities. Architectural drawings shall take precedence over mechanical drawings. Because of the small scale of the mechanical drawings, it is not possible to indicate all offsets, fittings, valves, and accessories as may be required to meet such conditions.

4. The Contractor shall submit complete detailed shop drawings of the equipment design and arrangement for the Architect and Owner's approval (2 copies) for certain equipment listed below. These drawings must show piping arrangements and sizes, clearances, location of gauges, test cocks, etc., and all other pertinent information necessary for proper selection and installation. Equipment must fit into the available space with allowances for operation, maintenance, etc. The following equipment is involved:

   a. High Temperature Water heat exchangers and supports.

   b. Relief valves and safety valves.

   c. Gate, globe and angle valves.

   d. Air compressors.

   e. Compressed air driers.

   f. H. T. W. control panelboards.

   g. B. T. U. meters, and steam flow meters.

   h. Sump pumps.

   i. Ventilating fans.

   j. H. T. W. pipe and fittings.

5. The Contractor shall furnish the Owner complete printed and illustrated operating and maintenance instructions as specified in the "General Conditions," covering all units of mechanical equipment herein specified, together with parts lists. All literature shall be furnished in triplicate and shall be suitably bound in book form.

SECTION 3. APPLICABLE SPECIFICATIONS

1. The following specification standards and publications of the latest issues, but referred to hereafter by basic designation only, form a part of this specification.

   a. American Society for Testing Materials Specifications:

A-53-57T	Welded and Seamless Steel Pipe
ASTM-A234-57T	Welded Steel Fittings

   b. American Standards Association Standards:

ASA-B16	Carbon Steel Welding Flanges and Flanged Fittings
B16.9-1951	Steel Butt Welding Fittings

   c. American Society of Mechanical Engineers Code:

Boiler Construction Code, Section IX: Standard Qualification for Welding Procedures and Welding Operator.

   d. American Standards Association Code:

B31.1-1955 Code for Pressure Piping (Incl. Supplement No. 1).

   e. American Welding Society Standard:

B3.0-51T	Standard Qualification Procedure

   f. Safety Code for Compressed Air Machinery and Equipment:

B19-1938

Section 4. PIPING

1. General:

   a. Installation: Provide and erect, in a workmanlike manner, according to the best practices of the trade, all piping shown on drawings and required for the complete installation of these systems. The piping shown on the drawings shall be considered as diagrammatic for clearness in indicating the general run and connections, and may or may not be shown in its true position. The piping may have to be offset, lowered, or raised as required or as directed at the site. This does not relieve the Contractor from responsibility for the proper erection of systems of piping in every respect suitable for the work intended as described in the specifications and approved by the Architect-Engineer.

   b. Fabrication: High temperature water piping shall be cut accurately for fabrication to measurements established at the construction site. Pipes shall be worked into place without springing and/or forcing, unless cold springing is specified, properly clearing all windows, doors, and other openings and equipment. Cutting or other weakening of the building structure to facilitate installation will not be permitted. All pipes shall have burrs and/or cutting slag removed by reaming or other cleaning methods. All changes in direction shall be made with fittings, except that bending of pipe will be permitted providing a hydraulic pipe bender is used. Bent pipe showing kinks, wrinkles, or other malformations will not be acceptable. All open ends of pipes and equipment shall be properly capped or plugged to keep dirt and other foreign materials out of the system. Plugs of rags, cotton waste, or similar materials shall not be used for plugging. All piping shall be arranged so as not to interfere with removal of other equipment or devices; and so as not to block access to manholes, access openings, etc. Piping shall be arranged so as to facilitate removal of tube bundles. Flanges or unions, as applicable for the type of piping specified, shall be provided in the piping at connections to all items of equipment. All piping shall be black steel unless otherwise specified.

   c. Concealment: No piping shall be concealed by covering conduits, expansion chambers, or molded insulating concrete without specific permission from the Owner after inspection.

   d. Expansion: H. T. W. piping shall be installed to permit free expansion and contraction without damage to or stresses on joints and hangers and to reduce strains on connected equipment to a minimum.

e. Branch Connections: All branch connections from both high temperature water flow and return mains shall be made an angle of 45° with the main in the direction of flow, unless otherwise specified or shown on the drawings. Connections shall be carefully made to insure unrestricted circulation, eliminate air pockets, and permit the complete drainage of the system.

2. H. T. W. Pipe Materials:

a. Pipe Specifications: High temperature water supply and return piping, 2 inches and larger, shall be seamless steel pipe, schedule 40 ASTM, Spec. A-53, grade B. All threaded pipe and all pipe 1-1/2 inches and smaller in diameter shall be electric resistance welded schedule 80 ASTM, A-53, grade A. Line pipe shall not be used.

b. Welding Fittings: H. T. W. pipe fittings 1 inch and larger shall be seamless, butt welding type, long radium pattern, of the same material and thickness as the pipe and conform to ASTM Spec. A-234, grade B for welding steel fittings. Fittings 3/4 inch and smaller shall be 2,000 lb. forged steel, screwed or socket weld type. Equipment connections 1 inch or larger shall be flanged. Equipment and valve connections 3/4 inch and smaller shall be socket welded or screwed, with unions to facilitate dismantling the pipe.

c. Pipe Flanges: Flanges shall be ASME Series 300 forged steel, welded neck type, or slip-on type with 1/16 inch raised face. Slip-on flanges shall be used only where required by space limitations.

d. Flange Studs: Flanges shall be bolted with alloy steel studs conforming to ASTM, A-193, grade B7, class 7 fit, and threaded full length; and complete with 2 heavy pattern, semi-finished, carbon steel, heat treated, hexagon nuts conforming to ASTM, A-194, class 2H.

e. Flange Gaskets: Gaskets for high temperature water piping flanges shall be spiral wound type 304 stainless steel, 300 lb. class, as manufactured by Flexittalic Style CG, or Goetze Style 913.

f. Unions: Unions shall be 3,000 lb. class forged steel, either screwed or socket-weld type, with steel to steel seat and conform to ASTM Spec. A-105 grade 2, as manufactured by Porter or Vogt. Normally unions larger than 3/4 inch shall not be used on H. T. W. piping.

g. Cast Iron: No cast iron materials shall be used on the H. T. W. pressure systems.

3. Low Pressure Piping:

a. Intermediate pressure and temperature and low pressure water, steam, and air piping shall be in accordance with the following schedule:

SERVICE	PIPE	FITTINGS
Steam - Low Pressure	Sch. 40 Black Steel	Std. Wt. Steel Welding Fittings or 125 lb. Black Cast Iron Flanged or Screwed.
Steam (100-200 Psig.)	Sch. 40 Black Steel	Std. Wt. Steel Welding or X. H. Black C. I. or Steel
Low Pressure Condensate and Boiler Feedwater	Sch. 80 Black Steel Seamless	Ex. Hvy. Steel Seamless Welding or Black C. I. Fittings.
Safety Valve Escape Pipes Vents, and Drains	Std. Galv. Steel	Galv. 150 lb. Malleable Iron Screwed.
Low Temperature Hot Water	Sch. 40 Black Steel	Std. Wt. Steel Welding Fittings or 125 lb. Black Cast Iron Flanged or Screwed.
140° and 180° Hot Water Domestic and Culinary	Type "L" Steamless Hard-Drawn Copper or Std. Galv. Steel	Solder Type Wrought Copper.
Cold Water	Std. Galv. Steel	Galv. 150 lb. Malleable Iron Screwed.
Compressed Air (1/2 inch and larger)	Std. Galv. Steel	Galv. 150 lb. Malleable Iron Screwed
Compressed Air (1/2 inch O. D. and smaller)	Type "L" Seamless Hard-Drawn Copper Tubing	Solder Type Wrought Copper or Flared Type Connectors at Equipment Connections Only

Instrument piping shall be in accordance with ASA Standard B31. 1-1955. Appendix I.

4. Pipe Construction:

a. Screwed Joints: Threaded pipe joints shall have American Standard taper pipe threads. Pipe ends shall be reamed to remove burrs after threading. Pipe points should be assembled using graphite and oil or an approved compound applied to the male threads only. Not less than 3 threads must show outside of pipe fittings after joints are made up, except in the case of recessed heavy steel fittings. Normally threaded pipe will be installed for H. T. W. piping in sizes 3/4 inch and smaller, and low pressure piping for sizes 2 inch and smaller, where specified.

b. Welding: Unless otherwise specified all joints between sections of pipe and between pipe and fittings 2 inches and larger shall be electric arc welded, and all joints on pipe only, not fittings, 1-1/2 inches and smaller shall be gas welded. The welding shall conform to American Standard Association Code B31. 1, Supplement No. 1. All changes in direction of pipes shall be made with welded fittings for sizes 1 inch and larger except as otherwise specified. Mitering of pipe to form elbows, notching straight runs to form tees, or any similar construction will not be permitted. Branch connections made at a 45° angle from supply and return pipes shall be fabricated. All welds shall be stamped with welder's initials.

5. Qualification of Pipe Welders:

Before assigning any welder to work covered by this specification, the Contractor shall provide the Owner with the names of pipe welders to be employed in the work, together with certification that each of these welders has passed qualification tests as prescribed by the National Certified Pipe Welding Bureau, or by other reputable testing laboratory using procedures covered in American Society of Mechanical Engineers Boiler Construction Code, Section IX, or in American Welding Society Standard B3. 0. If requested by the Owner, the Contractor shall submit identifying stenciled test coupons made by any welder in question. The Contractor shall require any welder to retake the tests, when, in the opinion of the Owner, the work of the welder creates a reasonable doubt as to his proficiency. Tests, when required, shall be conducted at no additional expense to the Owner. Recertification of the welder shall be made to the Owner only after the welder has taken and passed the required re-test.

6. Provision for Expansion:

Normally all H. T. W. Pipe expansion shall be accomplished by pipe deflection in offsets, bends, or loops. Pipes shall be cold sprung for one-half the designed expansion. Maximum allowable stress shall not exceed 22, 000 Psi. Expansion joints shall be specified only by expressed consent of the Owner's representative and shall be Pathway Bellows, Inc. Express Joints.

7. Pipe Hangers and Supports:

a. Pipe Supports: All necessary structural members, hangers and supports of approved design shall be provided to keep piping in proper alignment and to prevent transmission of injurious thrusts and vibrations. Pipe hangers shall be of the clevis pipe clamp type with suspension bolts for pipes 1-1/2 inches and smaller. High Temperature Water pipes 2 inches and larger shall use roller type supports. All bolts shall have provision for vertical adjustment and be equipped with locknuts. Hangers supported from upper floor steel shall be approved wrought steel beam clamps. Where concrete inserts are used they shall be suitably reinforced. Expansion shields may be used provided the hanger is not attached rigidly to the expansion bolt, but is supported from a suitable bracket held in place by expansion bolts. Spring and spring roller hangers shall be used wherever vertical movement of pipe occurs so that pipe and pipe hangers shall always be in absolute contact.

b. Support Spacing: The following is a schedule of maximum spacing for hangers or other supports and size of suspension rods:

Pipe Size	Rod Diameter	Maximum Spacing
1-1/4 inch and smaller	1/2 inch	8 feet
1-1/2 inch and 2 inches	1/2 inch	8 feet
2-1/2 inches and 3 inches	5/8 inch	10 feet
4 inches and 6 inches	3/4 inch	10 feet
8 inches and 10 inches	7/8 inch	16 feet
12 inches and 14 inches	1 inch	16 feet

c. Insulation Protection: Insulation of pipes, 2 inches and larger in diameter, shall be protected from damage, where supported by roller hangers, by suitable pipe covering protection saddles. Saddle shall support pipe on roller and shall be packed with insulation.

d. Anchors: Anchors shall be located where indicated by the drawings and shall be applicable to the type of piping installed. In general, the anchor shall conform to the details on the drawings. All anchor bolts, after tightening, shall be welded to the anchor frame in such a manner that all anchor bolts are effective. Additional restraining pipe supports shall be provided wherever danger of excessive pipe movement exists.

e. Heavy Pattern Nuts: All hangers, supports, and anchors shall be assembled with heavy pattern, hexagon carbon steel nuts.

f. Pipe Sleeves: All pipes passing through masonry construction shall be fitted with sleeves. Each sleeve shall extend through its respective floor or wall and shall be cut flush with each surface unless otherwise required. Unless otherwise specified, sleeves shall be three inches larger in diameter than the passing pipe when uninsulated and one pipe size larger than the overall outside diameter of the pipe when insulated. Sleeves in outside walls shall be made of galvanized steel pipe with a water-stop flange.

SECTION 5. VALVES

1. General:

   a. Valve Specifications: All valves in the high temperature water system 1 inch and larger shall be of the ASA 300 lb. class, cast steel body, flanged or weld ends, outside screw and yoke pattern, stainless steel trim with bolted bonnet and gland. Valves 3/4 inch and smaller shall be steel, ASA 600 lb. class, socket weld or screwed pattern, and outside screw and yoke type. Valve stuffing boxes shall be large and deep to accommodate a minimum of six packing rings for valves 2 inches and larger, and a minimum of four rings for valves 1-1/2 inches and smaller. The packing shall be Teflon impregnated for high temperature water service. A metal insert having proper stem clearance shall be provided at the bottom of the stuffing box to serve as a base for the packing. Valve stems shall have a beveled collar at the lower end which shall seat the valve under pressure when fully open. Flanged end valves shall have a 1/16 inch raised face on the flange. Valves are subject to shop drawings procedures.

   b. Weld Valves: All pipeline valves 4 inches and larger shall be gate valves, butt welded ends, and flanged bonnets. Valves of 3 to 1 inch sizes shall be steel gate, globe, or angle valves with flanged ends or weld ends as specified.

   c. Gate Valves: Gate valves shall be of the solid wedge type with stainless steel wedge or wedge faces, stainless steel seat rings, long, close-fitting stem guides with port opening full pipe diameter. Gate valves, 4 inch and larger sizes, shall have bypass valves.

   d. Globe Valves: Globe and angle valves shall be of the cast plug disc type with bevel seat and disc of stainless steel, long disc locknut, and with port opening full pipe diameter.

   e. Check Valves: Horizontal check valves shall be of the swing type. Valves shall have stainless steel discs. Discs shall be replaceable without removing valve from the pipe and be tight seating and full pipe diameter.

   f. Drain Valves: Drain Valves shall be sized as shown on the drawings. Drain valves shall be globe or angle forged steel valves.

   g. Small Valves: Vent valves shall be 600 lb. forged steel globe valves. Bypass valves shall be 600 lb. forged steel, plug seated globe valves designed for throttling service. Pressure gauge and instrument isolating valves shall be 1/2 inch 600 lb. bar stock valves.

   h. Valve Operators: Gate valves, 6 inch and larger, shall be lubricated, gear operated.

SECTION 6. TESTING, WASHING, AND FILLING PIPES

1. Tests for Piping:

The high temperature water distribution piping system shall be tested hydrostatically, before insulation is applied, and shall be proved tight with a pressure of 525 Psig. Pipes with expansion joints shall not be tested with a pressure higher than 400 Psig. and shall only be tested in the presence of the supplier of the expansion joints. A log of all tests shall be kept and furnished to the Owner. All tests can be made sectionally provided a final test of 400 Psig. is applied to the entire system. When required by the Owner's representative, pipe, but not welds, shall be pounded with a 2 lb. hammer during the test period. Upon completion of the above tests and prior to acceptance of the installation, the Contractor shall subject the high temperature water distribution system to such operating tests as may be required by the Owner to demonstrate satisfactory functional and operating efficiency. Operating tests and all tests shall be conducted at such times as the Owner may direct. All instruments, equipment, facilities, and labor required to conduct the tests properly, and all fuel, water, and electricity required for the tests will be furnished by the Contractor. Piping which fails to meet the above specified tests shall be replaced and retested without cost to the Owner.

2. Washing of Pipes:

After the completion of the high temperature water installation and after all pressure tests, the Contractor shall wash out the pipes as follows: A mixture of caustic soda and soda ash dissolved in Zeolite softened water shall be circulated through the pipes at a velocity of not less than .5 ft/sec. The chemicals shall be thoroughly dissolved before being introduced into the system water in proportions of 1 lb. of soda ash and 1 lb. of caustic soda per 1,000 lbs. of water. The water shall be heated to 225° F. and circulated through the system at that temperature. This process shall be continued for not less than 8 hours, whereupon the entire system shall be drained and thoroughly washed with fresh water. The Central Heating Plant pumping and heating equipment cannot be used during the washing out period, and it will, therefore, be the responsibility of the Contractor to furnish auxiliary equipment for this purpose.

3. Filling of Pipes:

Water softened by processing through a Zeolite or approved equal softener shall be used to initially fill the piping system. It shall be the responsibility of the Contractor to fill the new piping and also all existing piping which was drained in order to accomplish the new work. The Central Heating Plant facilities and capacity shall not be used for the filling of new and drained piping.

SECTION 7. INSULATION

1. Pipe Covering:

   a. Insulation Specification: The molded pipe insulation employed shall be incombustible, non-corrosive when wet, a non-conductor of electricity, and shall be of a type which will not adhere to the pipe when wet, thus permitting free expansion of the pipe. The pipe covering shall be capable of being thoroughly dried out without a change in physical or chemical properties and shall be equally unaffected by a pipe temperature of 450° F. The insulation shall have a thermal conductivity not in excess of 0.45 BTU. per hour per square foot per inch thickness at a mean temperature of 325° F. Insulation having a thermal conductivity in excess of that specified above will not be acceptable. Insulation shall retain its original insulating value throughout its service life. Insulation shall have a sufficient structural strength and impact resistance to withstand normal conditions encountered in installation and shall be capable of being removed and reapplied repeatedly for inspection, repair, or moving of pipes without damage or loss of thermal efficiency. This specification excludes magnesia and fiberglass and includes hydrous calcium silicate.

   b. Insulation Samples: Samples of all pipe coverings shall be submitted to the Owner for approval before installation.

   c. Insulation Thickness: Unless otherwise specified or noted, all high temperature water supply and return piping in the Central Heating Plant, tunnels, underground tile conduits, manholes, and equipment rooms shall be insulated with a molded type of pipe covering as before specified in Section 7, 1-a above. All pipe insulation joints and/or broken edges and holes in insulation shall be filled with plastic material to the specified thickness not less than the following:*

Pipe Size	Insulation Thickness	Nominal Performance "C" Factor	Mean Temp. 325° F. "R" Factor
1-1/2" and under	1 inch		
2 inches	1-1/2 inches		
3 inches	1-1/2 inches	.30	3.33
4 inches	1-1/2 inches		
6 inches	2 inches		
8 inches	2 inches	.225	4.45
10 inches	2-1/2 inches	.18	5.55
12 inches	3 inches	.15	6.67

NOTE: Exception: Piping buried underground in molded insulating concrete conduit.

d. Flange Insulation: Pipe insulation shall be stopped short of all flanges and beveled off to permit removal of flange bolts. Flanges shall be insulated with sectional pipe insulation to a thickness equal to that of the insulation on the adjacent piping and covered with hard finish asbestos cement. Flange insulation shall be applied only after all bolts have been retightened and pipes have been heated.

e. Insulation Jacket: Insulation shall be finished with an 8-ounce canvas jacket pasted or sewed on in a neat manner, except that the canvas jacket shall be omitted in the underground conduit piping, and roofing felt or aluminum sheet applied. Pipe and fittings in manholes shall be covered with aluminum jacket.

f. Insulation Underground: Piping in concrete chambers provided at expansion loops and bends and piping in concrete trenches and tile conduits shall receive the required thickness of calcium silicate insulation securely wired with No. 14 bare copper wire loops every 8 inches and shall be covered with a 60 lb. roofing felt lapped 3 inches on ends. The roofing felt shall be securely held in place with copper straps or stainless steel bands (3/4 inches wide x .020 inch thick,) not more than 18 inches apart.

g. Wet Insulation: Particular care shall be exercised to prevent pipe and equipment insulation from becoming wet, both before, during, and after installation. Insulation which does become wet before, during, and/or after installation shall be dried out to the complete satisfaction of the Owner. The Owner shall be notified in writing that the insulation has become wet, together with a description of the methods to be used for drying the insulation. Any failure to comply with this requirement may result in replacing all insulation which has been wet at the discretion of the Owner.

2. Heat Exchangers:

a. Insulation Specifications: High temperature water heat exchanger shells and tanks shall be insulated with not less than 2 inches of calcium silicate insulation. The insulation shall be securely wired to the converter. The insulation shall be finished with hard-finish cement, applied over a 1-inch galvanized wire mesh, in 2 separate coats, and troweled to a smooth finish. All insulation shall be finished with an 8-ounce canvas jacket pasted or sewed in place in a neat manner.

b. Head Insulation: The heat exchanger H. T. W. heads shall be insulated as stated above for the tanks except that the insulation shall be beveled at the tank and pipe flanges for maintenance purposes, and so that the head insulation may be removed repeatedly without excessive damage or loss of thermal efficiency.

c. Insulation Sealer: All equipment and piping insulation canvas shall be sized with a heavy application of Arobol or Sealfast sealer. No glue size shall be used.

3. Insulating Concrete Conduit:

a. Formed Insulating Concrete Conduit: The underground pipes, to the extent indicated on the drawings, shall be installed side by side in a conduit consisting of a monolithic mass of insulating concrete with external waterproof envelope and supporting structural pad. The insulating concrete mix shall have a thermal conductivity in an oven-dry condition not in excess of 0.75 BTU per square foot per hour for a temperature gradient of 1° F. per inch thickness at a mean temperature of 325° F. To conform to insulation specifications called for in Section 7, 1-a, this insulating concrete shall be at least twice the thickness of insulation having a "K" factor of .45 called for in Section 7, 1-c, or the thicknesses recommended by the Concrete Thermal Casings, Inc. (see Table). The pipes shall be installed with space between pipes, and space between pipes and supporting concrete mat, not less than shown on the drawings. The minimum thickness of insulating concrete provided between the outer wall and side or top surface of the conduit shall not be less than the following:

Pipe Size	Insulation Thickness	Nominal Performance "C" Factor	Mean Temp. 325°F. "R" Factor
3" and under	4 inches		
4 inches	6 inches		
6 inches	6 inches	.125	8.00
8 inches	6 inches		
10 inches	8 inches		
12 inches	8 inches	.94	12.55

b. Supporting Concrete Mat: The supporting structural concrete mat shall be composed of 3,000 lb. concrete reinforced with 6 x 6 No. 6 AWG wire mesh and shall not be less than 4 inches in thickness. One-half inch expansion joints shall be placed each 100 feet and at manholes and buildings. The individual pipes shall be covered with asphalted corrugated paper to permit free movement due to expansion and shall be supported by insulating blocks placed on top of the waterproofing envelope over the supporting pad. These blocks shall be spaced 10 feet on center. The concrete mat thickness shall be increased at the anchor and guide locations. See drawings for guide and anchor concrete thickness.

The concrete mat shall be sprayed with an approved curing compound to reduce surface shrinkage cracks to a minimum.

c. Provision for Expansion: Expansion of pipes shall be provided for by loops and/or bends as shown on the drawings. Positive voids shall be provided in the molded insulating concrete at the offsets and two vents on the low side to pitched drains within the conduits which emerge at both ends as detailed. This detail shall be approved by the Owner before proceeding with the installation.

d. Waterproof Envelope: Waterproof envelope shall be a high temperature resistant polyvinyl chloride sheeting. Plastic sheeting shall be non-reinforced, homogeneous, waterproof, and virtually impermeable, weighing approximately 20 ounces per square yard. The material will show no cracking or flaking, when at a temperature of 0° F. it is bent through 180° over a 1/32 inch mandrel and then bent at the same point over the same size mandrel in the opposite direction through 360°. Plastic sheeting shall be stable at elevated temperatures and have less than 5% weight loss when exposed to boiling water for 200 hours, or to hot air at 220° F. for 200 hours. Adhesives for use with the sheeting shall be chemically compatible with residual plasticity.

Plastic sheeting shall be installed above the concrete mat but under the piping and support blocks and shall be turned up inside the forms prior to pouring of insulating concrete. After the insulating concrete has set and the forms removed, membrane shall be placed over the top and down the sides of the insulating concrete overlaping the sheet laid before pouring by not less than 3 inches at joints, and thoroughly cemented with adhesive so as to form a completely water-tight envelope. The waterproof envelope shall be carefully protected during construction to avoid damage or puncture and shall be lapped, counter-flashed, and sealed at buildings, expansion loops, and junctions with other structures.

e. Backfilling: The Z-Crete conduit shall be carefully backfilled with selected sand by hand shovels on both sides and top to a thickness not less than 6 inches. The sand shall contain no stones larger than 1 inch diameter and shall be hand, or hand machine, compacted.

f. Protection Mat: The portions of conduit installed beneath roads and and parking areas shall be protected with a 4-inch reinforced concrete mat extending 6 inches on each side of the insulating conduit, as shown on the drawings.

g. Outside Walls: The Z-Crete insulating conduit shall pass through concrete walls with a full size block-out provided through the wall for this purpose.

h. Supervision: Underground conduits shall be installed under the direct and continuous supervision of the Manufacturer's authorized representative. Particular care shall be taken to prevent the conduit insulation from becoming wet either before or during the installation, and insulation which becomes wet from any cause shall be properly dried out before installing or shall be replaced at the discretion of the Owner. Any noncompliance with the Manufacturer's recommendations shall be reported in writing to the Owner by the Manufacturer's representative supervising the installation. At the completion of the underground installation, the Manufacturer's representative shall deliver to the Owner a certificate stating that the underground installation has been made in accordance with the Manufacturer's recommendations. This conduit shall be Z-Crete Insulating Concrete Conduit as manufactured by Concrete Thermal Casing Corporation.

i. Alternate Bid: The Contractor is invited to submit an ADD or DEDUCT bid for an alternate underground conduit. The alternate bid must describe fully the Manufacturer's specifications and validated insulation guarantees. See "Instructions to Bidders," Section 16, MATERIALS.

SECTION 8. H. T. W. CONVERSION ROOMS

1. Location:

The high temperature water conversion rooms shall normally be constructed outside of, but adjacent to, the building to be served. The intent here is to avoid piping the H. T. W. inside the building where an undiscovered leak would cause inestimable damage. There shall be external stairs with a door leading to the conversion room which will usually be an underground vault.

2. Construction:

The conversion room shall be constructed of reinforced concrete and of ample size as shown on the drawings. Ventilation shall be provided either by gravity or forced as required by the conditions. The floor should be sloped to the sides of the room and an adequate gutter shall be provided on three sides and sloped to a sump pit with drain or sump pump. The concrete shall have Anti-Hydro added and be waterproofed externally with cold tar pitch.

3. Facilities:

The conversion room shall be well lighted and have one or more duplex electric convenience outlets of the 3-wire grounded type. A hose bib shall be installed on the city water piping.

4. Security:

A door shall be installed to open outward with a spring type door knob and key lock from the outside only and keyed to match existing security key series.

5. Connections:

a. Entrances: The H. T. W. piping shall enter the conversion rooms from underground and be fitted with H. T. W. Flow and H. T. W. Return service entrance gate valves. There shall be a 1/2 inch plug-seated globe type bypass valve installed between the H. T. W. Flow and H. T. W. Return pipes inside of the service entrance valves and conversion room. The H. T. W. pipes shall be suitably anchored at the entrance to the conversion rooms by such methods that the expansion of the distribution system does not affect the conversion room piping.

b. Accessibility: All valves shall be installed with the stems horizontal or above, and shall be regulated, packed and glands adjusted at the completion of the work before final acceptance. All piping shall be erected to insure proper draining, and all valves and specialties arranged to permit easy operation and access.

c. Pipe Sizing: High temperature water supply and return pipes shall be sized so that the total head loss between the branch take-off at the supply and the equipment room effluent including all valves and equipment does not exceed 10 lbs. when operating at design capacity, and the water velocity does not exceed 5 ft/sec.

d. Isolating Valves: Each heat exchanger shall have flanged isolating valves of the globe or angle type on both high temperature water connections to the coil. The automatic control valve shall be installed in the high temperature water return pipe from the heat exchanger and fitted with a correctly sized plug-seated globe valve bypass.

e. Equipment Supports: Pumps, air compressors, and all similar equipment shall be mounted on 4-inch high concrete bases.

f. Drains and Overflows: Piping, 4-inch and smaller, from drains, vents, and overflows shall be installed using standard weight, galvanized steel piping with standard weight galvanized malleable fittings, free from fins and burrs, with standard pipe threads. Drains and overflows shall be terminated over floor gutter adjacent to equipment. Furnish drains from all pump bases to floor gutter. All H. T. W. drains shall be high pressure piping.

g. Air Removal: Air separation chambers shall be installed at all high points in the high temperature water piping or as shown on the drawings. Air chambers shall be fabricated with a 12-inch nipple and weld cap one half the diameter of the attached pipe, but in no case less than 3-inch diameter. A 1/2-inch globe type purge valve and vent pipe shall be installed for venting, be amply supported, and shall discharge over floor drains or gutter.

h. Strainers: Strainers shall be installed upstream of all high temperature water control valves as shown on the drawings. Strainers shall be basket or Y type and have a cast steel body and be designed for 400 Psig. and 400° F. steam service. Strainers shall contain a stainless steel cylindrical strainer sleeve having 3/32-inch perforations. The total area of free opeinings in the removable insert shall have a minimum of 3.30 times the cross sectional area of the pipeline in which it is installed. A blowdown valve is not required.

i. Thermometers: An indicating thermometer shall be installed in the conversion room for high temperature water flow temperature as shown on the drawings. Also an indicating thermometer shall be installed on the high temperature water effluent from all heat exchangers.

j. Pressure Gauges: Pressure gauges shall be installed on the high temperature water supply and return piping in all conversion rooms and flush mounted on a specified panelboard.

6. Equipment Arrangement:

Heat exchangers and other equipment, together with their connecting piping, shall be arranged to facilitate operating and maintenance functions. Space allowance must be provided to enter manholes and for tube bundle removal. Maintenance areas and passageways shall be free from overhead and underfoot pipes and other obstructions. Because of the small scale of the mechanical drawings it is not possible to indicate all offsets and fittings and locations of all valves. The Owner reserves the right to make reasonable changes in the location of pipes, valves, etc. during progress of construction.

SECTION 9. CONVERSION ROOM ACCESSORIES

1. Air Compressors:

Air Compressors of the motor driven, standard air-cooled piston type, complete with ASME storage tank, valves, gauges, filters, belt guards, and all necessary appurtenances for automatic pressure control shall be installed in conversion rooms to supply compressed air for operation of the pneumatic controls. Each compressor shall be a complete unit designed for 100 Psig. and sized to provide full operation of the control equipment based on the compressor not operating more than 25% of the time. Compressor shall operate at about 60 Psig. pressure. An outdoor air intake and intake filter shall be provided in a dry and accessible location.

2. Air Driers:

A motor driven, refrigerated moisture condensing unit of full air compressor capacity, similar to Royce Model L-10F-1 or Hankinson Corp., Series E., shall be installed in the discharge of all instrument air compressors.

3. Panelboard:

A wall mounted or free standing panelboard shall be provided for the mounting of pressure gauges and controls. All heat exchanger controllers, compressed air supply pressure gauge, and high temperature water supply and return pressure gauges are to be mounted on panelboard. The panelboard is to be factory fabricated, bonderized, and finished in light gray machinery enamel. All instruments are to be flush mounted and labeled for identification.

4. Pressure Gauges:

   a. H. T. W. Pressure Gauges: Pressure gauges for high temperature water systems shall be Ashcroft Duragages or Crosby Precision gauges with stainless steel tubes. Gauges shall be 4-1/2 inches or 6 inches in diameter as specified with a pressure range of 0-400 Psig., white face and black letters, a guaranteed accuracy of 1/2% of scale, 1/2 inch connection, and fitted with syphon and a 1/2 inch, 600 lb. bar-stock isolating valve.

   b. Steam Pressure Gauges: Pressure gauges for high temperature water steam generators shall be compound gauges, 4-1/2 inches in diameter with a pressure range of twice the operating pressure, syphon and a 1/2-inch isolating lever handle cock, and meet H. T. W. Pressure Gauge specifications as detailed above.

c. L. P. Pressure Gauges: Pressure gauges for compressed air and all low pressure service shall be 3-inch diameter, or as stated on the drawings.

5. Thermometers:

a. H. T. W. Thermometers: Indicating thermometers for high temperature water equipment shall be of the industrial, mercury-filled, glass bulb, red-reading type with a nine-inch (9") scale, five degree (5°) graduations, and a temperature range of 50° to 550° F. The thermometers shall have dustproof brass cases with chrome trim and bold-face black numerals upon a white non-glare background. Thermometers shall be fitted with a 3/4-inch stainless steel separable socket and a 3-inch extension neck for insulation. Cases shall be installed either straight, angle, reclining, inclining, or right or left angle turn with respect to the stem depending upon the application. The Contractor shall select the proper stem orientation necessary to render the thermometer "easily readable" from the operating position. Thermometers shall be manufactured by Weiss, Palmer, or Owner approved equal.

b. Water Thermometers: Indicating thermometers for low pressure applications shall meet the above specifications, except the temperature range shall be 30° to 300° F. with a 7-inch scale, and the separable socket may be brass.

6. Sump Pumps:

Vertical sump pumps for surface drainage shall be heavy duty self-contained submersible pump units with a 1/2 HP, 115/230 Volt, single phase 60 cycle, totally enclosed motor. The pump shall be complete with a liquid level control totally enclosed automatic starting switch. The pump casing and impeller shall be bronze. The pump intake shall be provided with a heavy pattern brass strainer. The pump shall be capable of handling 30 Gpm. at a total head of 30 feet. Specify Fairbanks Morse Model CD558 for hot water service.

7. Low Pressure Valves:

All low pressure valves 1-1/2 inches and smaller for installation on applications of steam, water, and compressed air including gate, globe, angle and check valves shall be bronze body with stainless steel trim and rated for not less than 200 Psig. for steam.

8. B. T. U. Meters:

a. Meter Function: B. T. U. meters shall be installed to record the flow of H. T. W. in pounds per hour, the flow and return water temperatures, and combine these 3 values into B. T. U. consumption and record. The B. T. U. consumption shall be integrated. The meters shall be electrically operated. Two recording instruments will be required.

b. Primary Element: The primary metering element shall be designed for 53-inch head meter normally, complete with orifice flanges and stainless steel orifice plate, supplied by Meter manufacturer. Orifice shall be installed in the H. T. W. return pipe.

c. Temperatures: The meter recorder temperature range shall be 0-600°F. with a nominal flow temperature of 360° F., a nominal return water temperature of 250° F., and a designed temperature differential of 200° F.

d. Charts: The meter charts shall be 12-inches and direct reading for all the information, with a seven day chart, chart drive, and fountain pens. One year's supply of charts and ink shall be supplied. The meter pens shall be color coded: Flow - red, Flow-Temp. - blue, Return Temp - green, and B. T. U. - red, Temp. Dif. - purple.

9. Steam Flow Meters:

a. Meter Function: Steam flow meters shall record the flow of steam in pounds per hour, and steam pressure (Psig.). The steam flow shall be integrated, and the meter electrically operated.

b. Primary Element: The primary metering element shall be designed for 120" head, complete with orifice flanges and stainless steel orifice plate and be supplied by the meter manufacturer.

c. Meter Charts: The meter charts shall be 12 inches and direct reading for all the information, with a seven day chart, chart drive, and fountain pens. One year's supply of charts and ink shall be supplied. The meter pens shall be coded: Flow - red, Pressure - purple.

10. Manufacturer:

Meters shall be manufactured by Bailey Meter Company. Meters shall be mounted on a separate factory fabricated panelboard as shown on the drawings. This equipment is subject to shop drawings procedure.

11. Inspection:

Bailey Meter Company shall specify the straight pipe requirements and inspect the primary metering element during construction to determine that all requirements for accuracy are satisfied.

SECTION 10. PAINTING

1. Manholes, Trenches, Underground:

Pipe supports, anchors, alignment guides, ladders, hangers, etc., in manholes and concrete trenches shall be delivered to the site with one coat of iron oxide paint. After erection the steel shall receive two coats of asphalt dark gray varnish specified for high humidity applications before pipes are insulated. Pipe hangers, supports, anchors, alignment guides, heat exchangers, valves, etc., in tunnels and conversion rooms shall be delivered to the construction site with one coat of iron oxide paint. After erection all equipment, not insulated, shall be painted with two additional coats of contrasting color machinery enamel with the finish coat as specified in color schedule for H. T. W. conversion rooms.

2. Conversion Rooms:

The H. T. W. conversion room structure, heat exchangers, equipment, and piping shall be painted with one coat of primer and two additional coats of enamel with color schedule as follows:

Ceiling	Fuller Gloss White #1520
Walls	Fuller Gray #3
Floor	Fuller Chinese Red #1516
H. T. W. Steam Generator	Fuller Gloss White #1520
Steam Piping	Fuller Gloss White #1520
H. T. W. Converters	Fuller Blue #1
H. T. W. Piping Insulation	Fuller Blue #1
Steel Doors, Ladders, etc.	Fuller Gray-Blue #1544
City Water Piping	Fuller Jade Green #1528
Air Piping	Crest-Lite Synchrome Aluminum
Drain Piping & Escape Pipes	Galvanized
Pumps and Motors	Fuller Blue #1549
Pipe Hangers & Supports	Fuller Gray-Blue #1544

3. Valves and Flanges:

Uninsulated H. T. W. valves and flanges shall be solvent cleaned and painted with aluminum paint especially designed for high temperature, 750° F., application. (Tropical H. D.)

4. Identification:

All equipment, machinery, and piping shall be identified by suitably sized contrasting color lettering easily readable from the operating floor. In addition, all piping shall have flow arrows painted to show direction of flow of contents. See B. Y. U. Utility Painting and Identification System.

SECTION 11. HIGH TEMPERATURE WATER STEAM GENERATORS

1. General:

   a. Specifications: Steam generators shall be constructed in accordance with the ASME Code for Unfired Pressure Vessels and TEMA Class C. Code, and shall bear the approval stampings required by these Codes complete with Insurance Inspection Certificate. The steam generators shall have the capacity to generate steam of the required pressure as indicated on the drawings or specifications when supplied with 360° F. high temperature water. The over-all dimensions of steam generators shall conform to the dimensions shown on the drawings, and shall be so proportioned that the steam space occupies at least 55% of the volume of the shell of the steam generator. The minimum heating surface shall be determined by the Architect/Engineer and include a "fouling factor" of .002 on the steam side, but no "fouling factor" need be considered on the high temperature water side. The rate of steam generation and the maximum allowable quantity of high temperature water flowing through the tube bundles shall conform to the requirements set forth in the design analysis. The H. T. W. terminal temperature difference shall not exceed 15° F. at maximum capacity. Steam generator units shall be the product of one manufacturer. H. T. W. steam generators shall be manufactured by Repco Engineering, Inc., Montebello, California; Patterson-Kelly Co., East Shroudsberg, Pennsylvania; or Termxchanger, Inc., San Francisco, California.

   b. Shop Drawings: Outline drawing and specification sheets shall be submitted to both the Architect/Engineer and Owner for approval in accordance with Section 7 of the General Conditions of the Contract, showing details of design, construction and materials, and a brief design analysis and computation for the amount of tube heating surface in sq. ft. offered.

2. Shell:

   Shells shall be constructed for an operating pressure of 150 Psig. and shall be subjected to a hydrostatic test pressure of 225 Psig. Shells shall be weldment fabricated from carbon steel plates and meet the applicable requirements of the ASME Code and National Board of Boiler Inspectors. H. T. W. heads shall be bonnet type of cast or fabricated steel with confined gasket joint. Tube sheets shall be attached to shell with 4-shouldered bolts or similar construction so that H. T. W. heads can be removed without disturbing gasket between the tube sheet and shell. A steam separator of an approved type shall be built in at the top of each steam generator. Interior of shell shall be painted with two coats of "Apexior" No. 1 at the factory.

3. Supports and Mountings:

   Steam generators shall be mounted on a pipe stand or structural steel frames. Suitable steel saddles shall be provided for each generator. Shells shall pitch toward blowdown.

4. Tubes:

   Tube bundles shall be the U-tube type with bends stress relieved, designed to provide for expansion and contraction, and arranged for easy removal through a flanged shell opening for cleaning and inspection. All tubes shall be designed for an operating pressure of 400 Psig. and 400° F. water temperature and shall be subjected to a hydrostatic test pressure of 600 Psig. Pressure drop through tubes shall not exceed 8 feet, and velocity shall not exceed 7 feet per second. Tubes shall be positioned by square pitch in flange quality steel tube sheet and not less than 1/4 inch cleaning lane between tubes. Tubes shall be 5/8 inch or 3/4 inch O. D., seamless, and constructed of the following material: No. 18 BWG Copper-Nickel (90% copper, 10% nickel). Tube bundle shall not normally exceed 8 feet length over all.

5. Steam Generator Piping Connections to be Provided:

   a. High temperature water flow connection to coil - 300 lb. ASA flanged.

   b. High temperature water return connection to coil - 300 lb. ASA flanged.

   c. 1/2 inch drain from H. T. W. head - coupling.

   d. Steam outlet nozzle - 150 lb. ASA flanged.

   e. Feedwater inlet - coupling.

   f. 1-inch blowdown-installed on the bottom at manhole end - coupling.

   g. 1/2 inch pressure gauge connection - coupling.

   h. Safety valve connection - 150 lb. ASA flanged for sizes 2-1/2 inches and larger.

   i. 12 x 16 inch manhole.

   j. 1/2 inch vent connection - coupling.

   k. 1/2 inch pressure controller connection - coupling.

   l. 1-inch equalizer connections to combination water gauge and feed-water controller (3) - couplings.

   m. 1/2 inch continuous blowdown connection - coupling.

   n. Others that may be shown on the drawings.

All pipe coupling outlets shall be 3,000 lb. and all nipples and nozzles shall be Schedule 80 pipe.

H. T. W. connections shall clear head flanges.

6. Steam Generator Accessories:

   a. Level Controller: Feedwater controller, mounted on the steam generator shall be Magnetrol W-126, complete with gauge glass and drain connections. Two electrical liquid level contacts shall be provided.

   b. Safety Valves: Drum safety valves shall be constructed and labeled in accordance with the ASME Code for Unfired Pressure Vessels. Relief capacity, not less than the steam generator rating, shall be stamped on the valve. Valve shall be set to pop at 10 Psig. above the operation pressure noted on drawings. Valve discharge shall be piped to outdoors in a safe area with full sized escape pipe. Minimum size shall be 2 inches. (Crosby-Ashton).

   c. Boiler Blowdown: Blowoff valve shall be sized 1-inch and shall be the sliding plunger type, seatless, screwed, especially designed for this type of service, and designed for 250 lbs. maximum working pressure. (Yarway Type B.)

   d. Boiler Blowoff Tank: There shall be a vented blowdown tank furnished and installed in locations where shown on the drawings. Blowdown tanks may be constructed of 16-inch diameter steel pipe (3/8 inch wall), by 48 inches long or a Wilson Series 83 centrifigual blowdown separator may be used. Tanks shall be provided with the following connections located as shown on the drawings:

      1-inch diameter inlet - in head near top of tank.

      2-inch diameter vent - in top of tank.

      2-inch diameter overflow - with internal syphon.

      1-inch diameter drain - in head at bottom of tank.

   e. Pressure Gauge: Pressure gauge shall be 4-1/2 inch diameter compound gauge and calibrated for twice the designed working steam pressure. See H. T. W. Spec., Section 9, 4-a.

7. Pressure Controller:

Pressure controllers for high temperature water steam generators shall be pneumatic instruments of the indicating type. They shall have a pressure range from 0 pressure to 50% above the working steam pressure. They shall have a proportional band (0-150%) and be equipped with an adjustable reset mechanism 1-10. Pressure controllers shall be actuated by a pressure element within the instrument. This element is to be connected by pipe or tubing to the steam space of the steam generator. The air output from the pressure controller shall actuate a valve positioner directly connected to a pneumatic control valve in the high temperature water return piping. The controller shall contain an auxiliary panel with a selector switch provided with auto, manual, and test positions. Pressure controllers shall be Honeywell, Inc., Series 704P to match existing equipment.

8. H. T. W. Control Valves:

Automatic control valves shall be single-seated, tight closing and shall have steel bodies with stainless steel trim. They shall be screwed for sizes 3/4 inch and smaller and flanged for 1 inch and larger. Valves shall be equipped with lubricating type stuffing boxes and shall have packing suitable for 400° F. water service. Valve discs shall be top and bottom guided. Valves shall be V-ported "equal percentage" type -- 50% stem travel in valve opening shall result in 20% maximum flow. Control valves and control instruments shall be reverse acting, designed to close on control-air failure. Where two control valves are installed in parallel on one steam generator, they shall be split control, one valve to operate 3-10 lbs. and the other valve from 8-15 lbs. air pressure. The valves shall be so constructed that either valve may be set in the field for either phase. Each instrument shall have its own drip well and supply air regulator. Valves shall be Honeywell, Inc., Series 800, to match existing equipment or Valtek, Inc. Control valve manufacturer shall size the valve from information supplied by the Engineer. Control valves shall be wall mounted.

9. Feedwater Pump and Condensate Receiver:

a. Feedwater Pump: A feedwater pump shall be installed for each steam generator unit. The pumps shall be duplicated if specified.

The feedwater pumps shall have a 30% capacity margin greater than the capability of the steam generator it serves, against the pre-determined head. Pumps shall be driven by drip-proof, ball-bearing motors and shall be controlled by a Magenetrol float switch on the steam generator. Pumps shall be a single suction, closed impellor, close coupled, centrifugal type and set on pump drip bases installed on a 4-inch high concrete pedestal (Chicago Pump Co.)

b. Condensate Receiver: The condensate receiver shall be a low-pressure steel tank designed for either horizontal or vertical mounting. The receiver shall be mounted so as to produce 3-feet minimum positive suction head on the feedwater pump(s). It shall have sufficient storage capacity to supply the steam generator it serves for 30 minutes. The condensate receiver shall be fitted with an automatic make-up water valve positioned to function only to prevent the feed-water pump from operating dry, and shall have outdoor vent, chemical feed, overflow, drain, and gauge glass. The make-up water valve shall be external float type with a strainer, pressure reducing valve, pressure gauge, bypass valve, and isolating valves and unions. Some installations will require a de-aerating feed-water heater and shall guarantee .03 cc/liter oxygen removal. (Schuab Eng. Co. or Owner approved equal).

10. Continuous Blowdown:

H. T. W. steam generators shall have a factory installed, internal continuous blowdown arrangement for applications requiring operation above 15 Psig. where substantial make-up water is required.

SECTION 12. HIGH TEMPERATURE WATER DOMESTIC HOT WATER GENERATORS

1. General

   a. Specifications: Domestic and culinary hot water generators shall be constructed and labeled in accordance with the ASME Code and the TEMA Class C Code for Unfired Pressure Vessels, and shall bear the approved stamping required by these codes. The shell shall be of steel and built for an operating pressure of 150 Psig., and tested at a pressure of 225 lbs. The minimum heating surface shall be determined by the Architect/Engineer and shall include a "fouling factor" of .005 on the low temperature water side. The high temperature water shall be 360°F. at the inlet with a terminal temperature difference not exceeding 50° F. at the maximum capacity. High temperature water shall flow inside the tubes and water to be heated shall be in the shell. H. T. W. head shall be bonnet type of cast or fabricated steel with confined gasket joint. Tube sheets shall be attached to the shells, so that H. T. W. heads can be removed without disturbing gasket between tube sheet and shell. The shell shall receive a Phenolic 3-coat lining applied at the factory, suitable for the conditions specified. Hot water generators shall be the product of one manufacturer. Domestic and culinary hot water generators shall be manufactured by Repco Engineering, Inc., Montebello, California; Patterson-Kelly Co., East Shroudsberg, Pennsylvania; or Thermxchanger, San Francisco, California.

   b. Shop Drawings: Outline drawings and specification sheets shall be submitted to both the Architect and Owner for approval in accordance with Section 7 of the General Conditions of the Contract, showing details of design, construction and materials, and a brief design analysis and computation for the amount of tube heating surface in sq. ft. offered.

2. Converter Tubes:

   Tubes shall be U-tube type with bends stress relieved, designed to provide for expansion and contraction, and arranged for easy removal through a flanged shell opening for cleaning and inspection. Tubes shall be designed for operation at 400 Psig. and 400° F. temperature and tested at 600 Psig. Tube sheets shall be of flange quality steel and drilled for 1 inch square pitch for 5/8 inch tubes and 1-1/8 inch square pitch for 3/4 inch tubes to provide for automatic scale shedding and mechanical cleaning. Pressure drop through the tubes shall not exceed 8 ft. and velocity shall not exceed 7 ft./sec. Tubes shall be 5/8 inch or 3/4 inch O.D., seamless and constructed of the following material: No. 18 BWG Copper-Nickel (90% copper, 10% nickel). Tube bundles shall not normally exceed 8 feet length over all.

3. Generator Piping Connections to be provided:

   a. High temperature water flow connection to coil - 300 lb. ASA flanged.

   b. High temperature water return connection to coil - 300 lb. ASA flanged.

   c. 1/2 inch drain on H. T. W. head - coupling.

   d. 12-inch by 16-inch manhole - below center line in rear head.

   e. Cold water inlet - 150 lb. ASA flanged for sizes 2-inch and larger.

   f. Hot water outlet for plumbing fixtures - 150 lb. ASA flanged for sizes 2-inch and larger.

   g. 1-inch or larger drain on the storage tank - coupling.

   h. 1/2 inch vent - coupling.

   i. Relief valve connection (1 or more as required) - coupling.

   j. 3/4 inch thermometer coupling in top of storage tank - coupling.

   k. 1-inch coupling for thermostatic bulb, located in rear head above manhole flange.

   l. 1/2 inch pressure gauge connection-coupling.

   m. Others that may be shown on the drawings.

   All pipe coupling outlets shall be 3,000 lb. and all nipples shall be Schedule 80 pipe.

   Flanged H. T. W. connections shall clear tube sheet upon removal.

4. Converter Accessories:

   a. Supports: Suitable saddles for mounting storage tank.

   b. Drain: 1-inch or larger gate valve.

   c. Relief Valve: Relief valves shall be all bronze and ASME tested and rated. One or two valves shall be installed as required to relieve the heat output of the converter coil. Valves shall be stamped to operate at 125 Psig. and provide 1 to 1-1/2" additional relief valve set at 150 Psig. Install full-size galvanized steel escape pipe with visible outlet to nearest floor drain. (WATTS No. 174A).

d. Thermometer: One mercury-filled thermometer, with 7-inch scale, and 6-inch immersion, graduated 30° F. to 300° F., separable socket connection, and extension neck for 3-inch insulation (see H. T. W. Spec., Sec. 9, 5-b).

e. Pressure Gauge: Pressure gauge, 4-1/2 inch diameter size, with pressure range of 0-160 lbs. with 1/2 inch bar-stock valve. (See H. T. W. Spec., Sec. 9, 4-a).

5. Recirculating Pump:

Furnish and install hot water recirculating pumps of sizes and types as specified. (Bell and Gossett).

6. Temperature Controller:

Temperature controllers for the domestic hot water heat exchangers shall be designed for automatic temperature regulation in the range of 100° to 200° F. They shall be of the indicating, modulating type with adjustable control point and adjustable differential. Sensing element for temperature control shall be mounted in a separable socket. Control instruments shall be Honeywell, Inc., No. RP908A with immersion sensor LP914. Controllers shall be panel mounted.

7. H. T. W. Control Valve:

Automatic control valves shall be single-seated, tight-closing, and shall have steel bodies with stainless steel trim. They shall be screwed for sizes 3/4 inch and smaller and flanged for 1-inch and larger. Valves shall be equipped with lubricating type stuffing boxes and shall have packing suitable for 400° F. water service. Valves shall be V-ported "equal percentage" type. Control valves (and control instruments) shall be reverse acting, designed to close on control-air failure. Valves shall be Honeywell, Inc., Series 800, to match existing equipment or Valtek, Inc. The control valve manufacturer shall size the valve based on information supplied by the Engineer. Control valves shall be wall mounted.

8. H. T. W. Domestic Hot Water Generator Sizes:

When domestic hot water generators exceed 1 million BTU/Hr. capacity and/or the heat exchanger coil exceeds 100 sq. ft. surface, consideration must be given to more efficient heat exchange equipment (P-K Series 500).

SECTION 13. HIGH TEMPERATURE WATER SPACE HEATING CONVERTERS

1. General

   a. Specifications: Hot water space heating converters shall be constructed and labelled in accordance with the ASME Code for Unfired Pressure Vessels and TEMA Class C Code and shall bear the approval stampings required by these Codes. The shell shall be built for an operating pressure of 150 Psig. and tested with a test pressure of 225 lbs. The shell shall have a 12-inch extension on low temperature water outlet end for installation of temperature control bulb. The minimum heating surface shall be determined by the Architect/Engineer and shall include a "fouling factor" of .001 at the low temperature side. No "fouling factor" shall be considered at the high temperature water side. The calculation shall assume a secondary system water temperature of 210° F. maximum at the outlet, at maximum load. The high temperature water shall be 360°F. at the inlet with a temperature terminal difference not exceeding 15° F. at the maximum capacity output. Pressure drop at maximum load on the shell side shall not exceed 8 feet. High temperature water shall flow inside the tubes and low temperature water shall be in the shell. H. T. W. head shall be bonnet type of cast or fabricated steel with confined gasket joint. Tube sheets shall be attached to shells with 4 shouldered bolts or similar construction so that H. T. W. heads can be removed without disturbing gasket between tube sheet and shell. Space heating converters shall be the product of one manufacturer. Space heating converters shall be manufactured by REPCO Engineering, Inc., Montebello, California; Patterson-Kelly Co., East Shroudsberg, Pennsylvania; or Thermxchanger, San Francisco, California.

   b. Shop Drawings: Outline drawings and specification sheets shall be submitted to both the Architect and Owner for approval in accordance with Section 7 of the General Conditions of the Contract, showing details of design, construction and materials, and a brief design analysis and computation for the amount of tube heating surface in sq. ft. offered.

2. Converter Tubes:

   Tubes shall be U-tube type with bends stress relieved, designed to provide for expansion and contraction, and arranged for easy removal through a flanged shell opening for cleaning and inspection. Tubes shall be designed for operation at 400 Psig. and 400° F. water temperature, and shall be subjected to hydrostatic test pressure of 600 Psig. Tube sheets shall be of flange quality steel with a 13/16 inch and 15/16 inch triangular tube pitch for 5/8 inch and 3/4 inch tubes, respectively. Pressure drop through the tubes shall not exceed 8 feet and velocity shall not exceed 7 ft/sec. Tubes shall be 5/8 inch or 3/4 inch, O. D., seamless, constructed of the following material: No. 18 BWG Copper-Nickel (90% copper, 10% nickel). Tube bundles shall not normally exceed 8 feet length over all.

3. Converter Piping Connections shall be provided as follows:

   a. High temperature water flow connection to coil - 300 lb. ASA flanged.

   b. High temperature water return connection from coil - 300 lb. ASA flanged.

   c. 1/2 inch drain from H. T. W. head - coupling.

   d. Hot water heating system flow - 150 lb. ASA flanged.

   e. Hot water heating system return - 150 lb. ASA flanged.

   f. 3/4 inch drain in tank - coupling.

   g. 1/2 inch pressure gauge connection - coupling.

   h. 1/2 inch vent - coupling.

   i. 1-inch temperature controller connection in extended shell (2) - coupling.

   j. Pressure relief valve - 150 lb. ASA flanged.

   k. Others that may be shown on the drawings.

   All pipe coupling outlets shall be 3,000 lb. and all nipples shall be Schedule 80 pipe.

   Flanged H. T. W. connections shall clear tube sheet upon removal.

4. Converter Accessories:

   a. Supports: Suitable saddles for mounting converter tank.

   b. Drains: 3/4 inch gate valve and hose bib adapter for drain.

   c. Relief Valve: Converter shell relief valves shall be constructed and labeled in accordance with the ASME Code for Unfired Pressure Vessels. Relief capacity, not less than the converter rating, shall be stamped on the valve. Valve shall be spring loaded and set at a pressure 50 lbs. above the normal pressure of the secondary water system. Valve shall have a test lever with provision to prevent water leaking from valve casing. Provide full size escape pipe to nearest floor drain. Minimum size shall be 2-inch (Watts No. 174A).

d. Thermometer: One mercury-filled thermometer with 7-inch scale graduated 30° to 300° F., 6-inch immersion, separable socket connection, and extension neck for 2" insulation (See H. T. W. Spec., Sec. 9, 5-b).

e. Pressure Gauge: Pressure gauge, 4-1/2 inch diameter size, with pressure range of 0-160 lbs. with 1/2 inch bar-stock valve (See H. T. W. Spec., Sec. 9, 4-a).

5. Temperature controllers for the high temperature water space heating converters shall be pneumatic instruments of the indicating type. They shall have a control range of 100° F. to 300° F. They shall have a proportional band (0-150%) and be equipped with an adjustable reset mechanism (1-10). Temperature controllers shall be actuated by a liquid or gas-filled thermal system and fully compensated. Bulb for temperature control shall have a union type separable socket, and capillary tubing shall be enclosed in a flexible metal covering and of sufficient length to allow mounting control instrument on panelboard. The air output from the temperature controller shall actuate a valve positioner directly connected to a pneumatic control valve in the high temperature water return piping. Each instrument shall have its own drip well and supply air regulator. The control shall contain an auxiliary panel with a selector switch provided with auto, manual, and test positions and related equipment. Controller shall contain a relay or interlock to close H. T. W. control valve whenever low temperature water circulating pump (s) is not operating. However, interlock shall not interfere with test operation of H. T. W. control valve from auxiliary panel. Temperature controllers shall be Honeywell, Inc., Series 604P, to match existing equipment.

6. H. T. W. Control Valve:

Automatic control valves shall be single-seated, tight-closing, and shall have steel bodies with stainless steel trim. They shall be screwed for sizes 3/4 inch and smaller and flanged for 1-inch and larger. Valves shall be equipped with lubricating type stuffing boxes and shall have packing suitable for 400° F. water service. Valve discs shall be top and bottom guided. Valves shall be V-ported "equal percentage" type - 50% stem travel in valve opening shall result in 20% of maximum flow. Control valves (and control instruments) shall be reverse acting, designed to close on control-air failure. Each instrument shall have its own drip well and supply air regulator. Valves shall be Honeywell, Inc., Series 800 to match existing equipment or Valtek, Inc. The control valve manufacturer shall size the valve based on information supplied by the Engineer. Control valves shall be wall mounted.

7. Secondary System:

The converter shall be piped and valved on the secondary water shell in such a manner that the converter can be isolated and drained for maintenance purposes without draining the secondary heating system. When two or more space heating converters are specified for a single installation either or both of the converters shall be piped and valved so that either can be isolated while the other converter remains in operation.

SECTION 14. HIGH TEMPERATURE WATER SNOW MELTING CONVERTERS

1. General:

   a. Specifications: Hot water anti-freeze snow melting converters shall be constructed and labeled in accordance with the ASME Code for Unfired Pressure Vessels and TEMA Class C Code and shall bear the approval stampings required by these codes. The shell shall be built for an operating pressure of 150 Psig. and tested with a test pressure of 225 lbs. Shell shall have a 12-inch extension on low temperature water outlet for installation of temperature control bulb. The minimum heating surface shall be determined by the Architect/Engineer and shall include a "fouling factor" of .0005 on the low temperature water side. No "fouling factor" shall be considered on the high temperature water side. The calculation shall assume an anti-freeze water of 120° F. maximum at the outlet, at a maximum rating. The high temperature water temperature shall be as specified at the inlet with a temperature terminal difference not exceeding 30° F. at maximum capacity output. Pressure drop at maximum load on the shell side shall not exceed 8 feet. High temperature water shall flow inside the tubes and low temperature anti-freeze shall be in the shell. High temperature water head shall be bonnet type cast or fabricated steel with confined gasket joint. Tube sheets shall be attached to shells so that the H. T. W. heads can be removed without disturbing gasket between tube sheet and shell. H. T. W. snow melting converters shall be the product of one manufacturer. Snow melting converters shall be manufactured by Repco Engineering, Inc., Montebello, California; Patterson-Kelly Co., East Shroudsberg, Pennsylvania; or Thermxchanger, Inc., San Francisco, California.

   b. Shop Drawings: Outline drawings and specification sheets shall be submitted to both the Architect and Owner for approval in accordance with Section 7 of the General Conditions of the Contract, showing details of design, construction and materials, and a brief design analysis and computation for the amount of tube heating surface in sq. ft. offered.

2. Tubes:

   Tubes shall be U-tube type with bends stress relief, designed to provide for expansion and contraction, and arranged for easy removal through a flanged shell opening for cleaning and inspection. Tubes shall be designed for operation at 400 Psig. and 400° F. water temperature and shall be subjected to a hydrostatic test pressure of 600 Psig. Tube sheets shall be of flange quality steel with a 13/16 inch or 15/16 inch triangular tube pitch for 5/8 inch and 3/4 inch tubes, respectively. Pressure drop through the tubes shall not exceed 8 feet and velocity shall not exceed 7 ft/sec. Tubes shall be 5/8 or 3/4 inch, O. D., seamless and constructed of the following material: No. 18 BWG Copper-Nickel (90% copper, 10% nickel). Tube bundles shall not normally exceed 8 feet length over all.

3. Converter Piping Connections shall be provided as follows:

   a. High temperature water flow connection to coil - 300 lb. ASA flanged.

   b. High temperature water return connection to coil - 300 lb. ASA flanged.

   c. 1/2 inch drain from H. T. W. head - coupling.

   d. Anti-freeze heating system flow - 150 lb. ASA flanged.

   e. Anti-freeze heating system return - 150 lb. ASA flanged.

   f. 3/4 inch drain in tank - coupling.

   g. 1/2 inch pressure gauge connection - coupling.

   h. 1/2 inch vent - coupling.

   i. 1-inch temperature controller connection in extended shell (2) - couplings.

   j. Pressure relief valve connection - coupling.

   k. Others that may be shown on the drawings.

   All pipe coupling outlets shall be 3,000 lb. and all nipples shall be Schedule 80 pipe.

   Flanged H. T. W. connections shall clear tube sheet upon removal.

4. Converter Accessories:

   a. Supports: Suitable saddles for mounting converter tank.

   b. Drains: 3/4 inch gate valve and hose bib adapter for drain.

   c. Relief Valves: Converter shell relief valves shall be constructed and labeled in accordance with the ASME Code for Unfired Pressure Vessels. Relief Capacity, not less than the converter rating, shall be stamped on the valve. Valve shall be spring loaded and set at a pressure 50 lbs. above the normal pressure of the secondary water system. Valve shall have a test lever with provision to prevent water leaking from valve casing. Provide full size escape pipe to nearest floor drain. Minimum size shall be 2" (Watts No. 174A).

d. Thermometer: One mercury-filled thermometer with 7-inch scale graduated 0° to 240° F., 6-inch immersion, separable socket connection with extension neck for 3-inch insulation. (See H. T. W. Spec., Sec 9, 5-b).

e. Pressure Gauge: Pressure gauge, 4-1/2 inch diameter size, with pressure range of 0-160 lbs, with 1/2 inch bar-stock valve. (See H. T. W. Spec., Sec. 9, 4-a).

5. Temperature Controller:

Temperature controllers for snow melting heat exchanger shall be for automatic temperature regulation in the range of 75° to 150° F. They shall be indicating, modulating type with adjustable control point and adjustable differential. Sensing element for temperature controller shall be mounted in a separable socket. Controller shall contain a relay to close the H. T. W. valve whenever the low temperature water pump is not operating. Control instruments shall be Honeywell, Inc., Series No. RP 908A, with immersion sensor LP914 to match existing equipment.

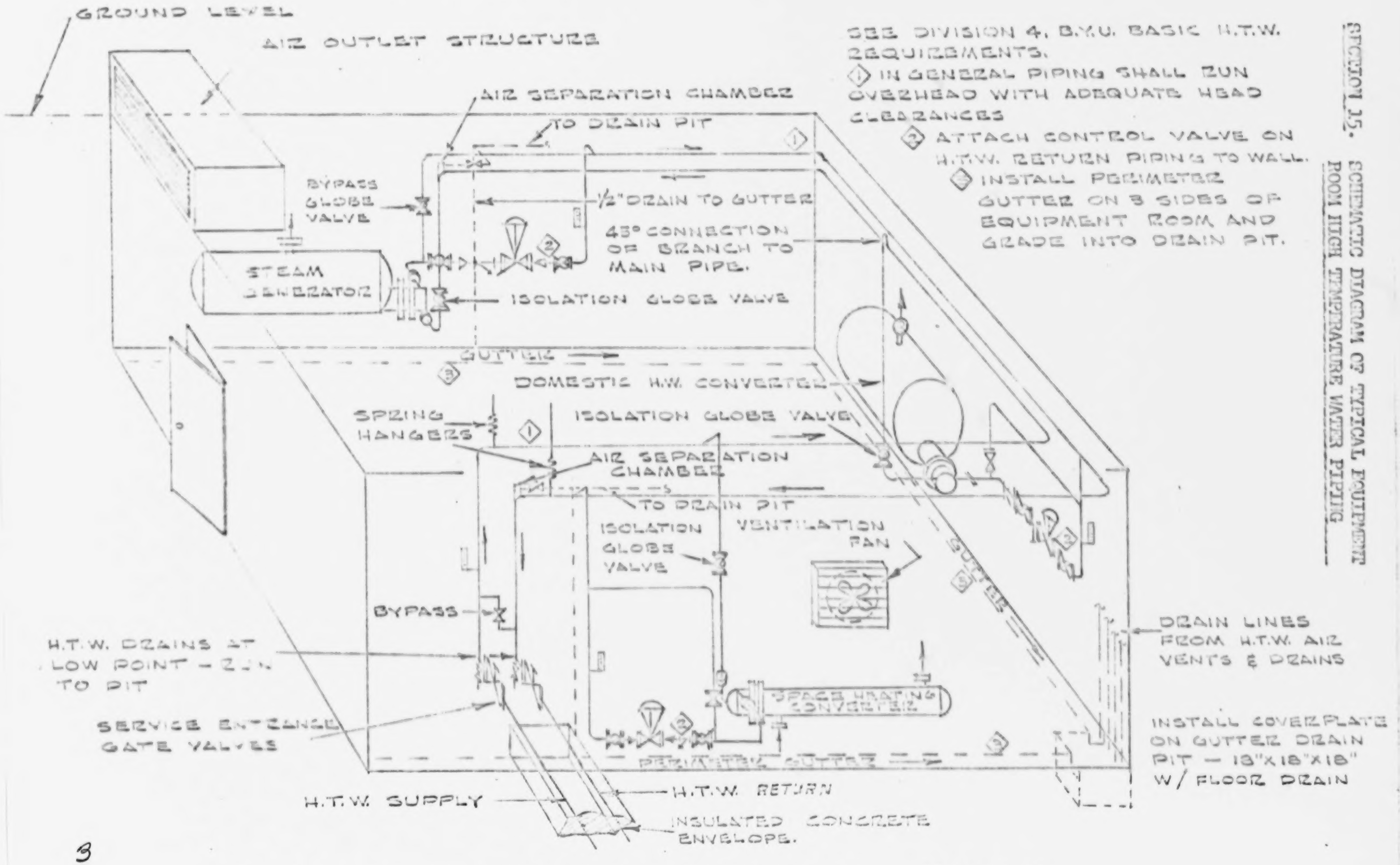
6. H. T. W. Control Valve:

Automatic control valves shall be single seated, tight closing, and shall have cast steel bodies with stainless steel trim. They shall be screwed for sizes 3/4 inch and smaller and flanged for 1-inch and larger. Valves shall be equipped with lubricating type stuffing boxes and shall have packing suitable for 400° F. water service. Valves shall be V-ported "equal percentage" type. Control valves (and control instruments) shall be reverse acting, designed to close on control-air failure. Valves shall be Honeywell, Inc., Series 800, to match existing equipment, or Valtek, Inc. The control valve manufacturer shall size the valve based on information supplied by the Engineer. Control valves shall be wall mounted.

7. Alternate H. T. W. Supply:

When a substantial snow melting installation is required, consideration shall be given to piping the H. T. W. effluent from the space heating converter(s) in series through the snow melting converter coil. The high temperature return water from the space heating converter(s) shall be directed either through the snow melting converter or to bypass the snow melting converter, as required, by a Honeywell, Inc., Series 800 three-way valve. The 3-way valve shall be controlled by the No. RP908A temperature controller with immersion sensor LP914 described above. Control valves shall be wall mounted.

SECTION 15. SCHEMATIC DIAGRAM OF TYPICAL EQUIPMENT ROOM HIGH TEMPERATURE WATER PIPING

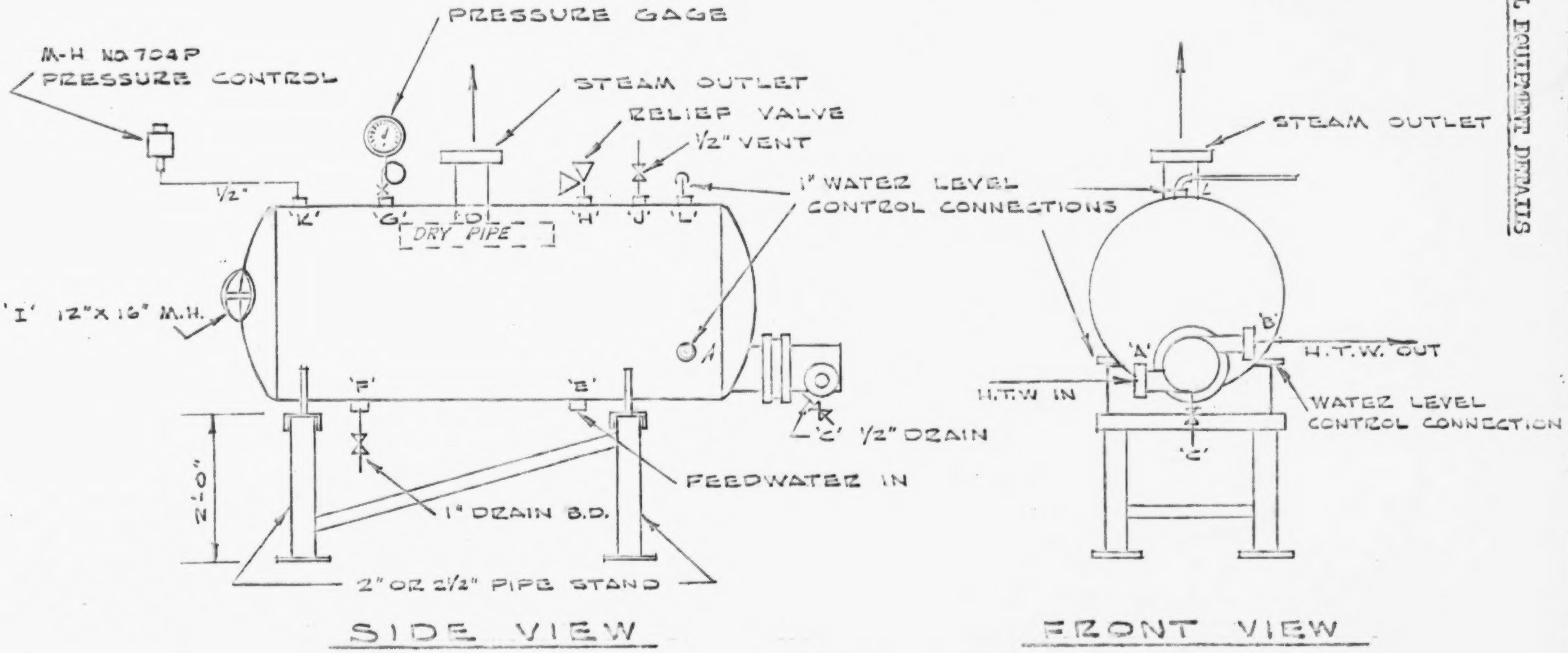

GROUND LEVEL
AIR OUTLET STRUCTURE
AIR SEPARATION CHAMBER
TO DRAIN PIT
BYPASS GLOBE VALVE
1/2" DRAIN TO GUTTER
45° CONNECTION OF BRANCH TO MAIN PIPE.
STEAM GENERATOR
ISOLATION GLOBE VALVE
GUTTER
DOMESTIC H.W. CONVERTER
SPRING HANGERS
ISOLATION GLOBE VALVE
AIR SEPARATION CHAMBER
TO DRAIN PIT
ISOLATION GLOBE VALVE
VENTILATION FAN
BYPASS
H.T.W. DRAINS AT LOW POINT - RUN TO PIT
SERVICE ENTRANCE GATE VALVES
SPACE HEATING CONVERTER
PERIMETER GUTTER
GUTTER
H.T.W. SUPPLY
H.T.W. RETURN
INSULATED CONCRETE ENVELOPE.
DRAIN LINES FROM H.T.W. AIR VENTS & DRAINS
INSTALL COVERPLATE ON GUTTER DRAIN PIT - 18"X18"X18" W/ FLOOR DRAIN
SEE DIVISION 4, B.Y.U. BASIC H.T.W. REQUIREMENTS.
① IN GENERAL PIPING SHALL RUN OVERHEAD WITH ADEQUATE HEAD CLEARANCES
② ATTACH CONTROL VALVE ON H.T.W. RETURN PIPING TO WALL.
③ INSTALL PERIMETER GUTTER ON 3 SIDES OF EQUIPMENT ROOM AND GRADE INTO DRAIN PIT.

3

TYPICAL H.T.W. EQUIPMENT ROOM

BRIGHAM YOUNG UNIVERSITY NOT TO SCALE 22 FEB. 61
REV. JULY 1965 RFP.

SEE SECTION 11, DIVISION 4

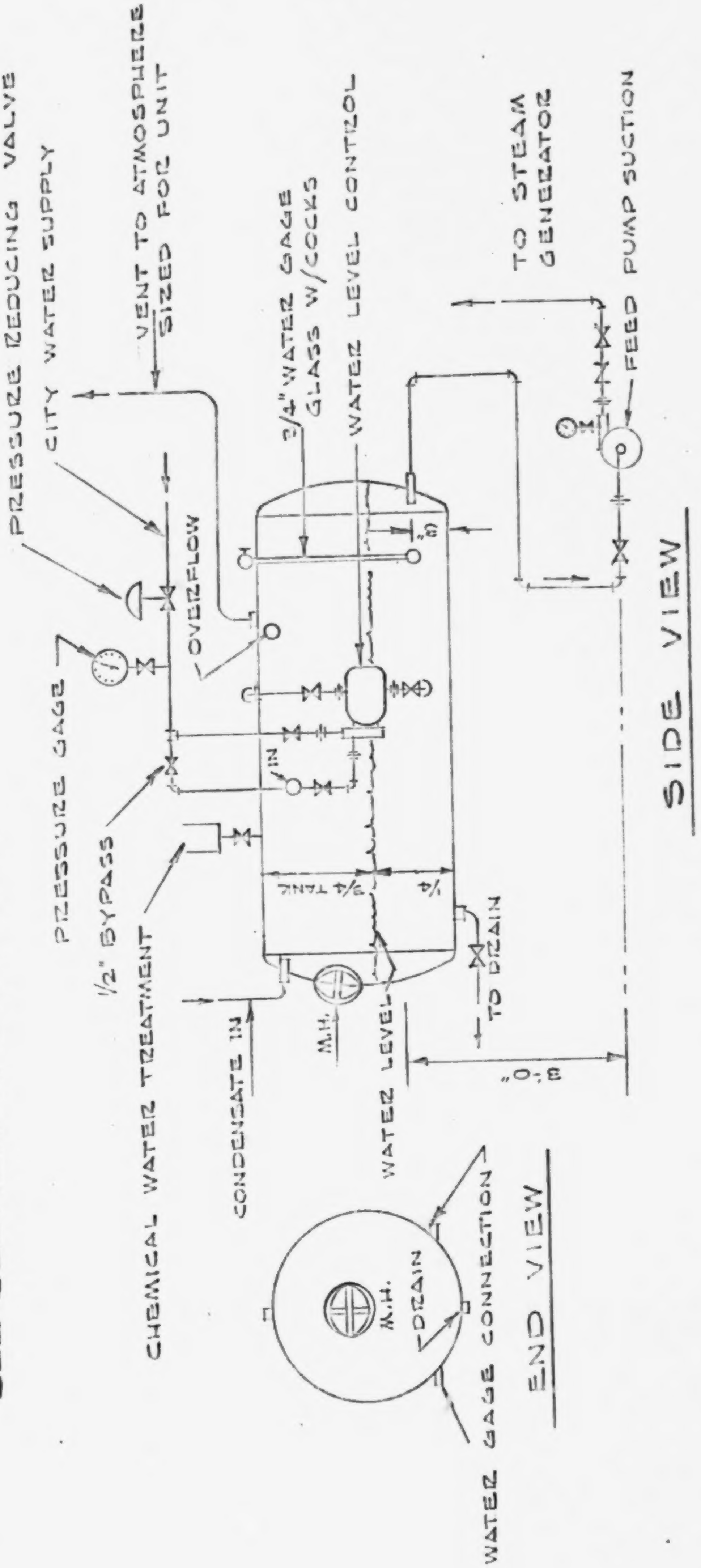

PRESSURE GAGE
M-H No. 704P
PRESSURE CONTROL
STEAM OUTLET
RELIEF VALVE
1/2" VENT
1" WATER LEVEL
CONTROL CONNECTIONS
1/2"
'K'
'G'
'D'
'H'
'J'
'L'
DRY PIPE
'I' 12"X 16" M.H.
'A'
'F'
'E'
'C' 1/2" DRAIN
FEEDWATER IN
1" DRAIN B.D.
2'-0"
2" OR 2 1/2" PIPE STAND
SIDE VIEW
STEAM OUTLET
'B'
H.T.W. OUT
'A'
H.T.W IN
WATER LEVEL
CONTROL CONNECTION
'C'
FRONT VIEW

H. T. W. STEAM GENERATOR

BRIGHAM YOUNG UNIVERSITY NOT TO SCALE 24 FEB. 61

REV. JULY 1968 R.F.P.

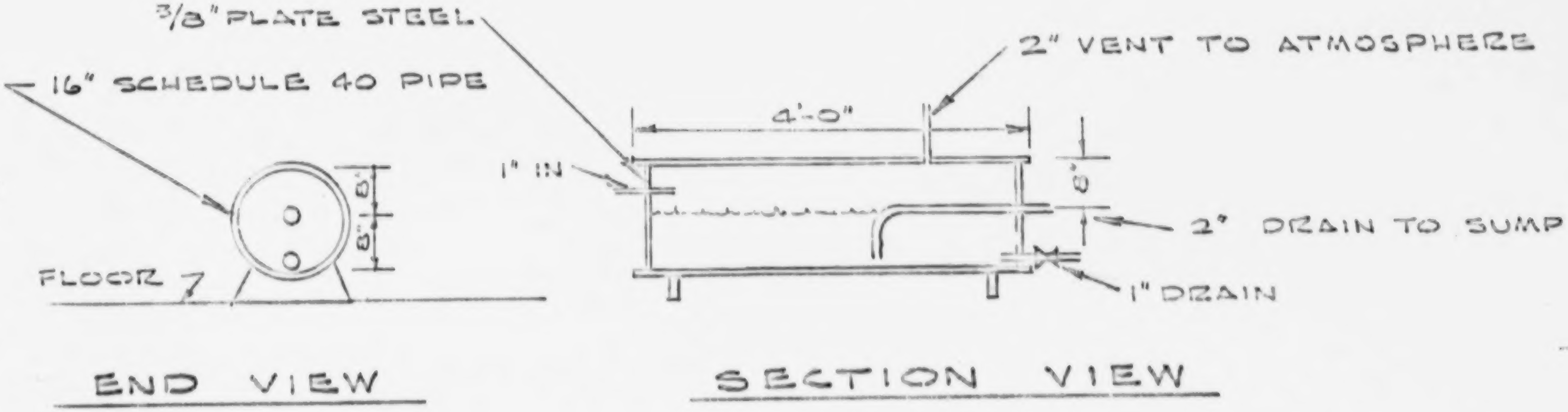
SEE SECTION 11, DIVISION 4


PRESSURE REDUCING VALVE
CITY WATER SUPPLY
VENT TO ATMOSPHERE
SIZED FOR UNIT
3/4" WATER GAGE
GLASS W/COCKS
WATER LEVEL CONTROL
TO STEAM
GENERATOR
PUMP SUCTION
FEED
OVERFLOW
PRESSURE GAGE
1/2" BYPASS
CHEMICAL WATER TREATMENT
CONDENSATE IN
M.H.
WATER LEVEL
TO DRAIN
3/4 TANK
1/4
3"
1"
3'-0"
SIDE VIEW
END VIEW
M.H.
DRAIN
GAGE CONNECTION
WATER GAGE CONNECTION

CONDENSATE RECEIVER TANK

BRIGHAM YOUNG UNIVERSITY NOT TO SCALE 27 FEB. 61

SEE SECTION 11, DIVISION 4



3/8" PLATE STEEL
16" SCHEDULE 40 PIPE
8"
8"
FLOOR
4'-0"
1" IN
2" VENT TO ATMOSPHERE
8"
2" DRAIN TO SUMP
1" DRAIN

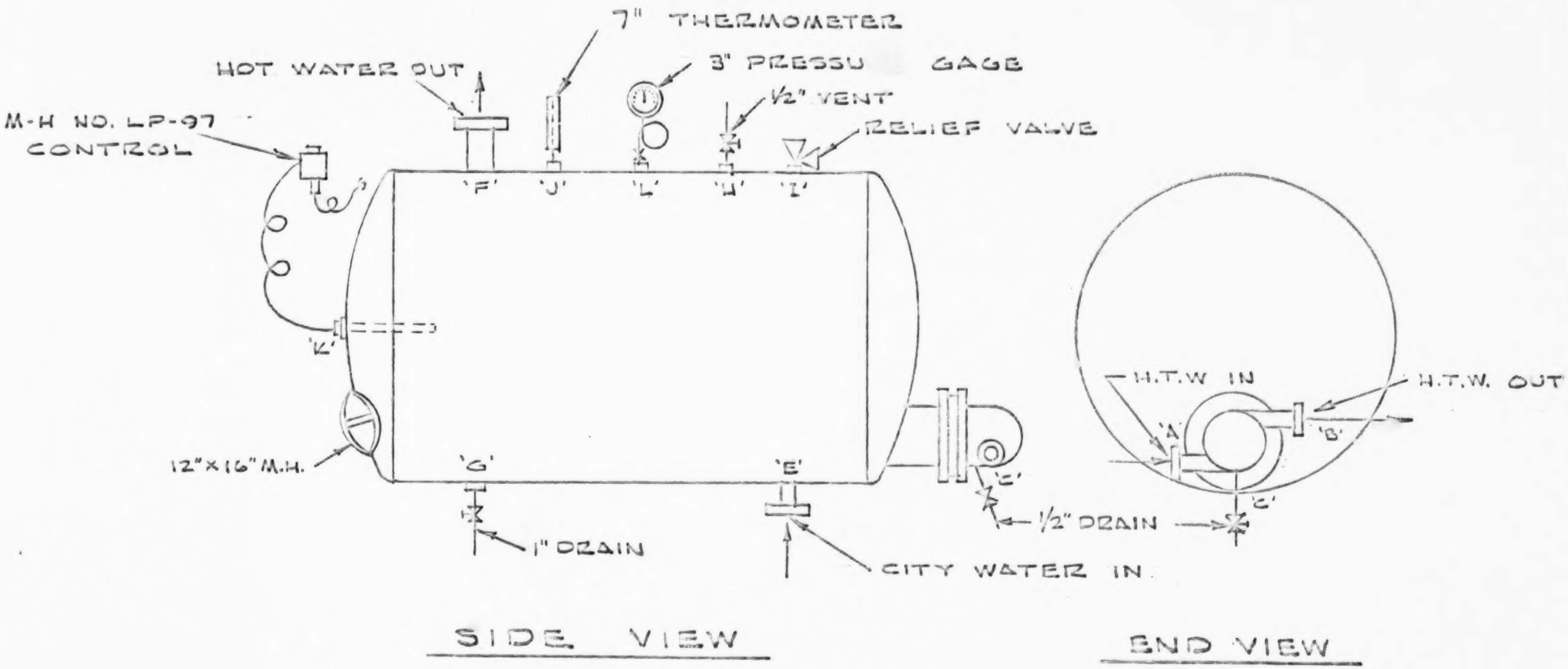
END VIEW

SECTION VIEW

BOILER BLOWDOWN TANK

BRIGHAM YOUNG UNIVERSITY NOT TO SCALE 27 FEB. 61

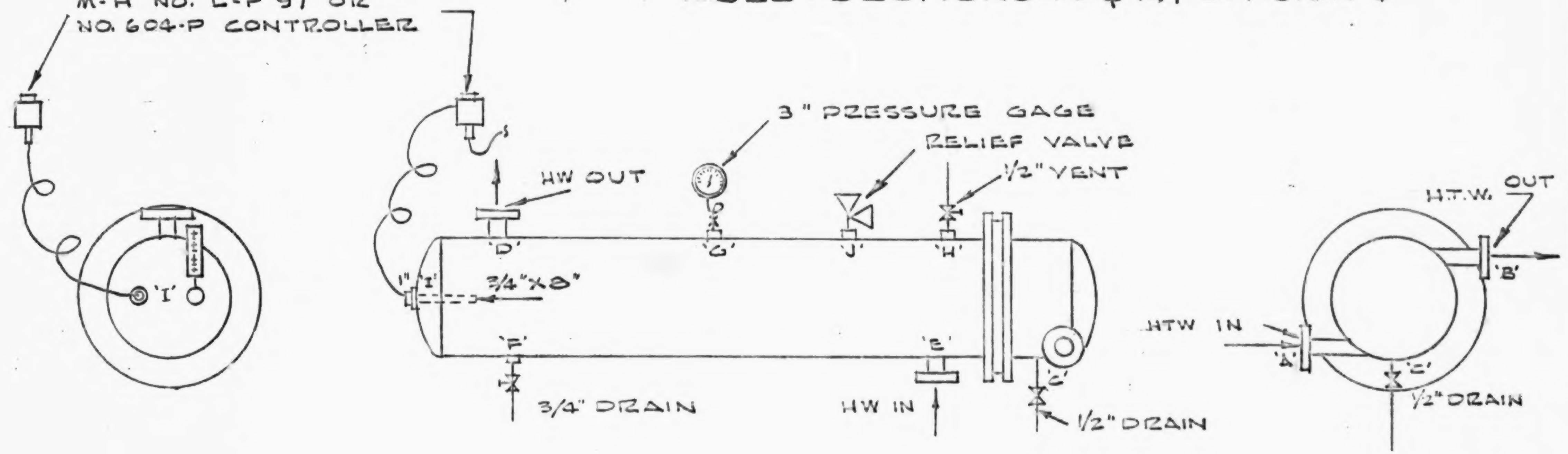
SEE SECTION 12, DIVISION 4


7" THERMOMETER
3" PRESSU GAGE
HOT WATER OUT
1/2" VENT
M-H NO. LP-97 CONTROL
RELIEF VALVE
'F'
'J'
'L'
'H'
'I'
'K'
12"×16" M.H.
'G'
'E'
'C'
1" DRAIN
CITY WATER IN
1/2" DRAIN
H.T.W IN
H.T.W. OUT
'A'
'B'
'C'
SIDE VIEW
END VIEW

DOMESTIC HOT WATER CONVERTER

BRIGHAM YOUNG UNIVERSITY NOT TO SCALE 27 FEB. 61

SEE SECTIONS 13 & 14, DIVISION 4


M-H NO. L-P 97 OR
NO. 604-P CONTROLLER
'I'
HW OUT
'D'
1" 'I'
3/4"X8"
'F'
3/4" DRAIN
3" PRESSURE GAGE
'G'
RELIEF VALVE
'J'
1/2" VENT
'H'
'E'
HW IN
'C'
1/2" DRAIN
H.T.W. OUT
'B'
HTW IN
'A'
'C'
1/2" DRAIN

REAR VIEW SIDE VIEW FRONT VIEW

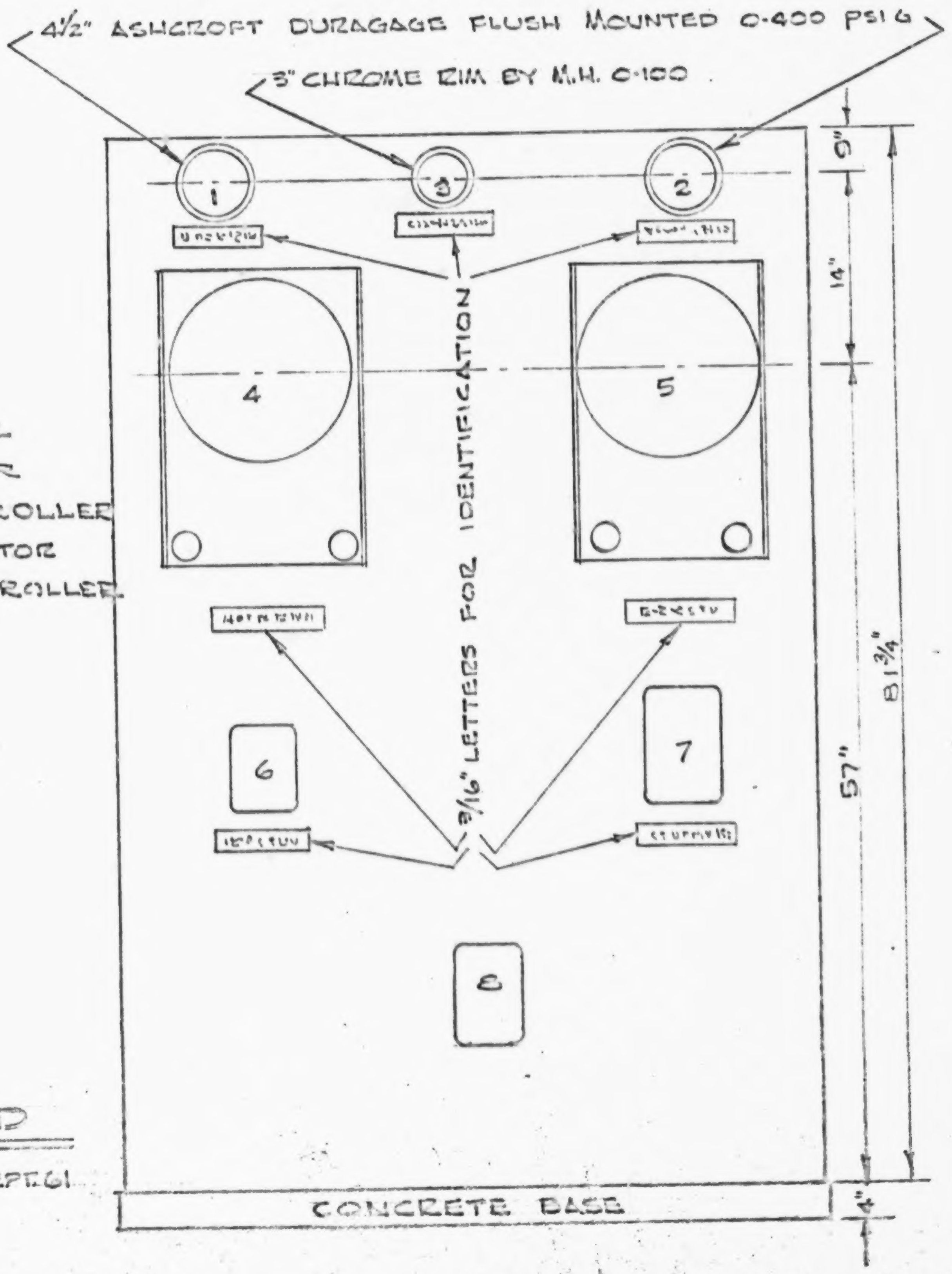
SPACE HEATING OR SNOW MELTING CONVERTER

BRIGHAM YOUNG UNIVERSITY NOT TO SCALE 27 FEB. 61

LEGEND

1. H.T.W. RETURN PRESSURE
2. H.T.W. SUPPLY PRESSURE
3. PRIMARY AIR SUPPLY PRESSURE
4. STEAM GENERATOR CONTROLLER
5. SPACE HEATING CONVERTER CONTROLLER
6. CULINARY OR DOMESTIC H.W. GENERATOR
7. SNOW MELTING CONVERTER CONTROLLER
8. ADDITIONAL CONTROLLERS

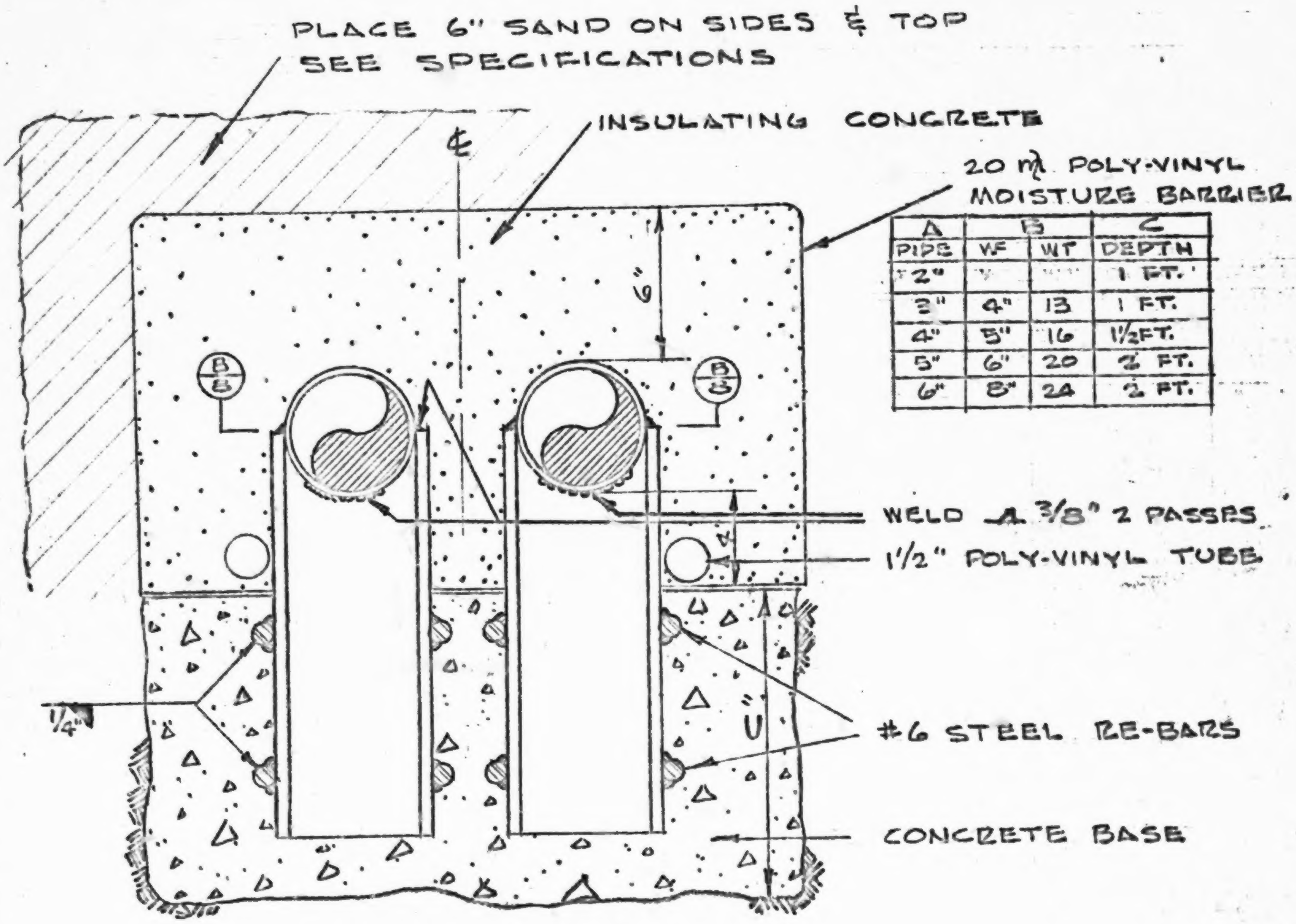
SEE ACCOMPANYING SPECIFICATIONS.


4½" ASHCROFT DURAGAGE FLUSH MOUNTED 0-400 PSIG
3" CHROME RIM BY M.H. 0-100
3/16" LETTERS FOR IDENTIFICATION
1
2
3
4
5
6
7
8
9"
14"
57"
81¾"
4"
CONCRETE BASE

TYPICAL H.T.W.

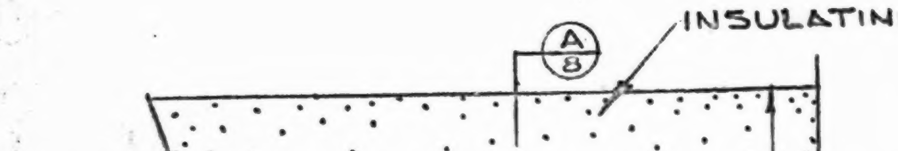
INSTRUMENT PANELBOARD

BRIGHAM YOUNG UNIVERSITY NOT TO SCALE 13 SEPT. 61

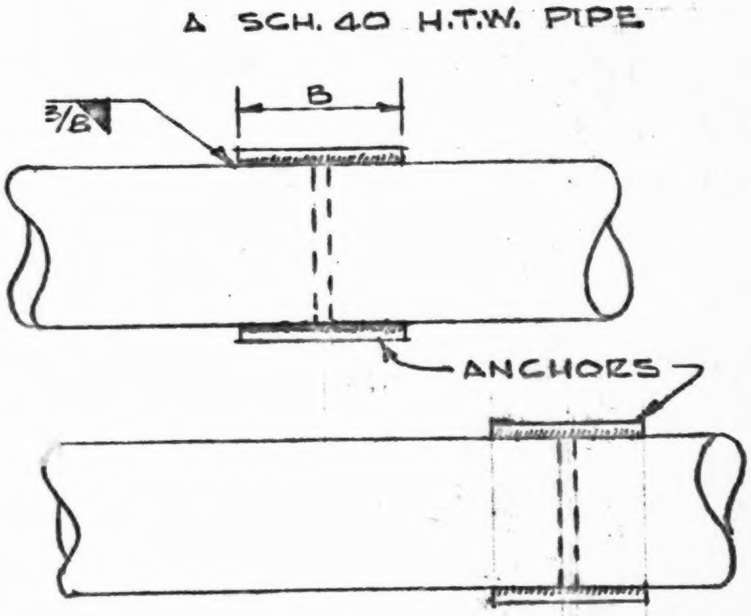

PLACE 6" SAND ON SIDES & TOP
SEE SPECIFICATIONS
INSULATING CONCRETE
℄
20 ml POLY-VINYL
MOISTURE BARRIER
6"
B/8
B/8
WELD 3/8" 2 PASSES
1/2" POLY-VINYL TUBE
1/4"
4"
U
#6 STEEL RE-BARS
CONCRETE BASE

A	B		C
PIPE	WF	WT	DEPTH
2"			1 FT.
3"	4"	13	1 FT.
4"	5"	16	1½FT.
5"	6"	20	2 FT.
6"	8"	24	2 FT.

SECTION A-A

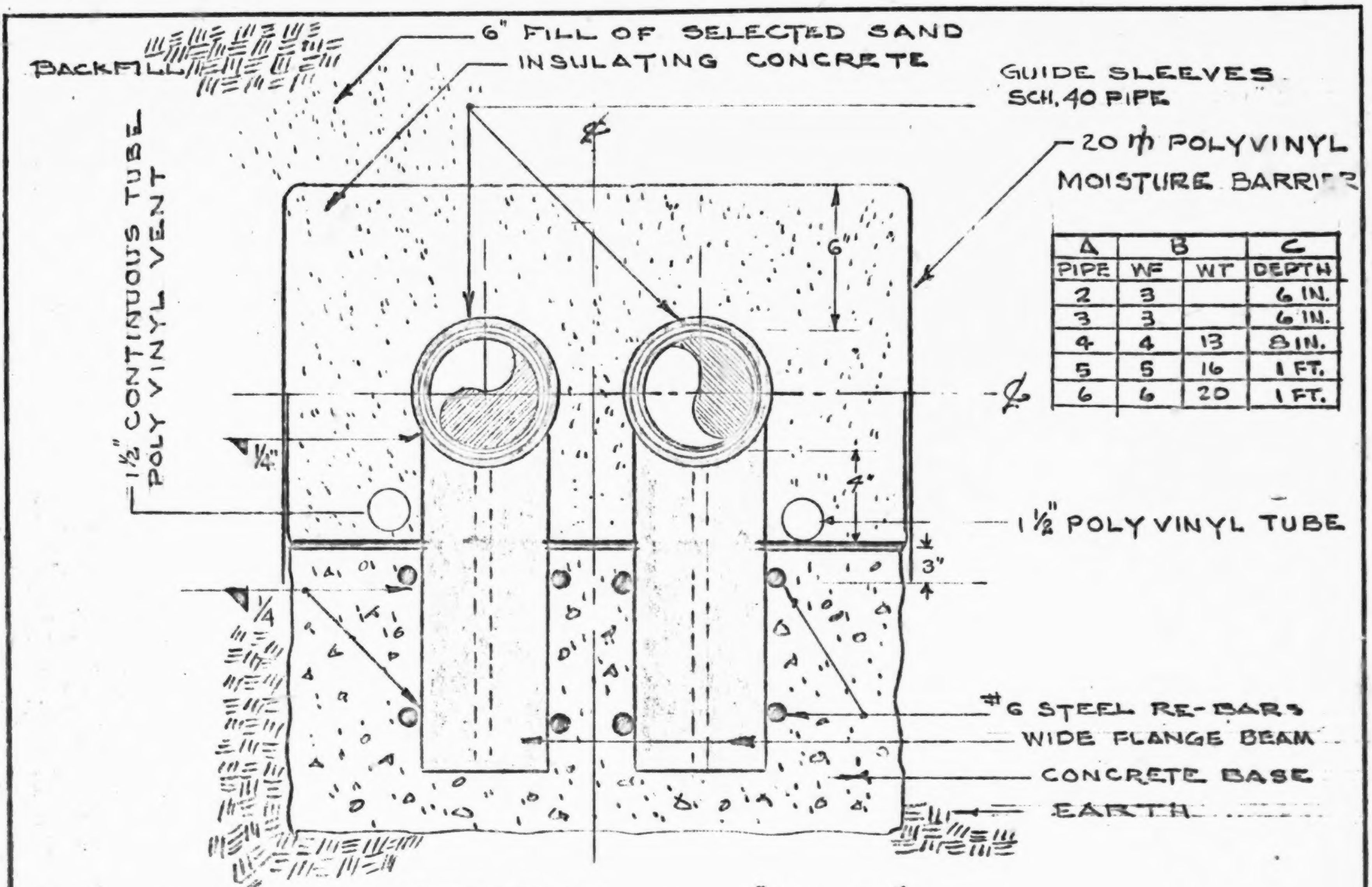

INSULATING CONCRETE
A/8
6"
B
℄
4"
TOP OF CONCRETE PAD
#6 RE-BARS
1/4"
U
3"
2"
CONCRETE
A/8

LONGITUDINAL SECTION


SCH. 40 H.T.W. PIPE
B
3/8
ANCHORS

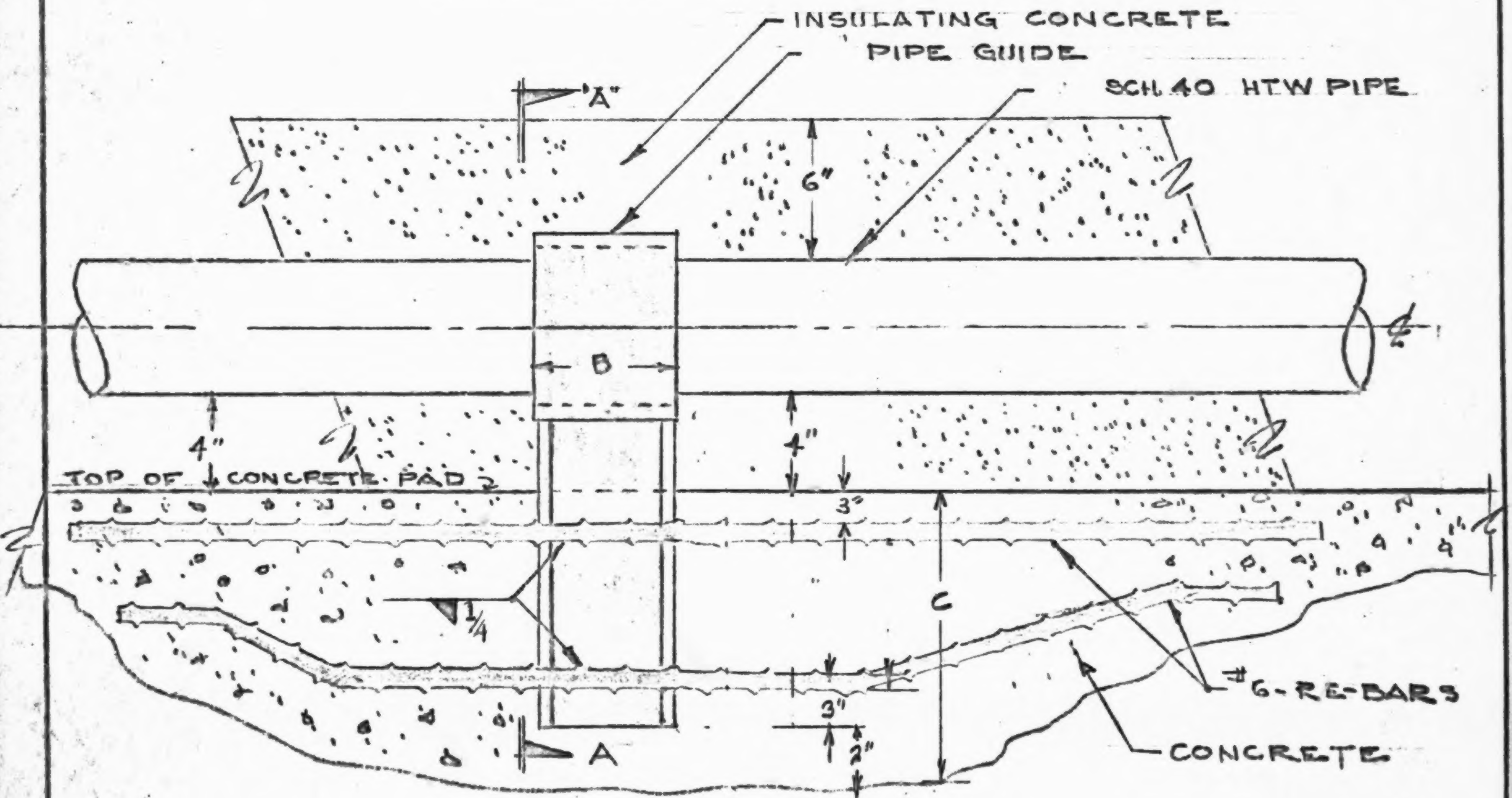
SECTION B-B

TYPICAL ANCHORS
H. T. W. PIPING


6" FILL OF SELECTED SAND
INSULATING CONCRETE
BACKFILL
GUIDE SLEEVES SCH. 40 PIPE
20 m̄ POLYVINYL MOISTURE BARRIER
1½" CONTINUOUS TUBE POLY VINYL VENT
6"
¼"
4"
3"
¼
1½" POLY VINYL TUBE
#6 STEEL RE-BARS
WIDE FLANGE BEAM
CONCRETE BASE
EARTH

A	B		C
PIPE	WF	WT	DEPTH
2	3		6 IN.
3	3		6 IN.
4	4	13	8 IN.
5	5	16	1 FT.
6	6	20	1 FT.

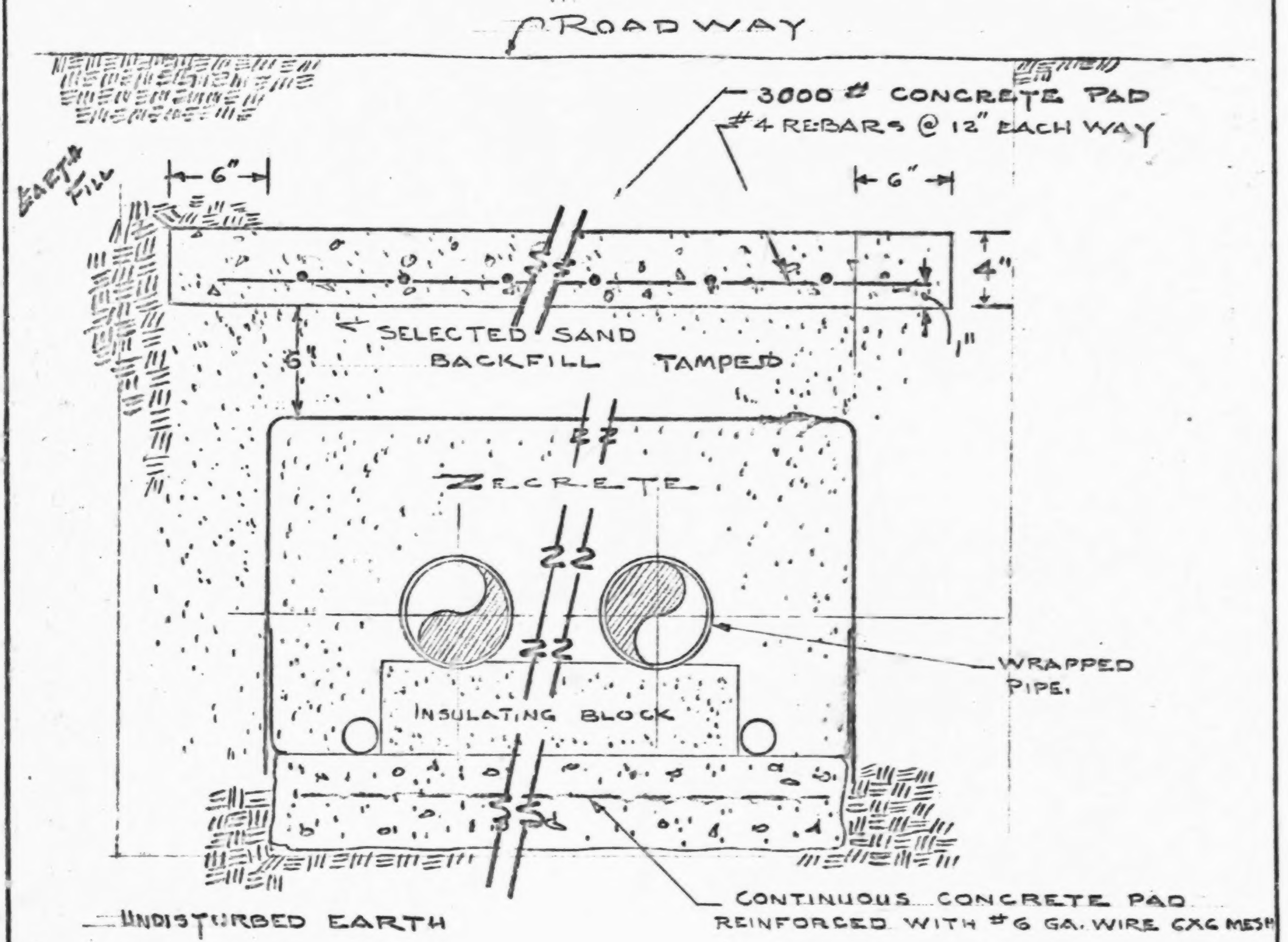
SECTION "A-A"


INSULATING CONCRETE
PIPE GUIDE
SCH. 40 HTW PIPE
"A"
6"
B
4"
4"
TOP OF CONCRETE PAD
3"
¼
C
3"
2"
A
#6-RE-BARS
CONCRETE

~ LONGTITUDINAL SECTION ~

APPROVALS

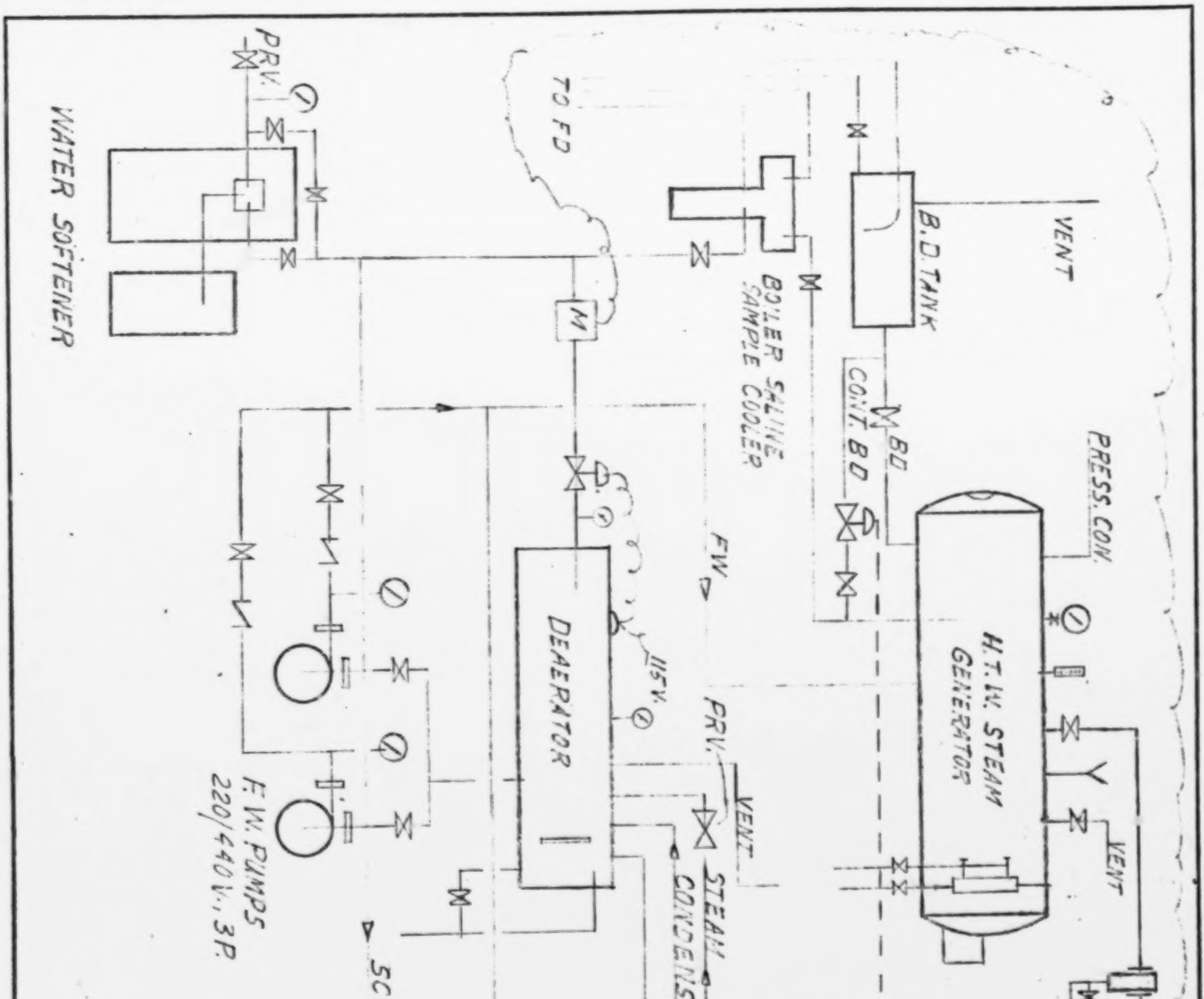
BRIGHAM YOUNG UNIVERSITY	H.T.W. PIPING	DWN. BY	Ed. Ogilvie	FILE NO.
		DATE	10-24-61	
PHYSICAL PLANT DEPARTMENT	TYPICAL GUIDES	SCALE	NONE	SHEET 9 OF 10


ROADWAY
3000 # CONCRETE PAD
#4 REBARS @ 12" EACH WAY
EARTH FILL
6"
6"
4"
1"
SELECTED SAND
BACKFILL TAMPED
6"
ZECRETE
WRAPPED
PIPE.
INSULATING BLOCK
UNDISTURBED EARTH
CONTINUOUS CONCRETE PAD
REINFORCED WITH #6 GA. WIRE 6X6 MESH

~ SECTION VIEW ~

APPROVALS

BRIGHAM YOUNG UNIVERSITY	H.T.W. CONDUIT	DWN. BY	F.J.OGILVIE	FILE NO.
PHYSICAL PLANT DEPARTMENT	PROTECTIVE PAD	DATE	10-24-61	
		SCALE	SHOWN	SHEET 10 OF 10


PRV.
WATER SOFTENER
TO FD
BOILER SALINE SAMPLE COOLER
B.D. TANK
VENT
CONT. BD
BD
PRESS. CON.
H.T.W. STEAM GENERATOR
VENT
STEAM SEPARATOR
STEAM
M
DEAERATOR
FW
115V.
PRV.
VENT
STEAM
CONDENSATE
RETURNS
SCW
CHEM FEED
F.W. PUMPS
220/440V., 3P.
CHEMICAL PUMPS
SO3
AMINE PO4
FAUCET
SW.
AIR-15P.
RELAY
EAGLE TIMER
115V.

APPROVALS

BRIGHAM YOUNG UNIVERSITY
PHYSICAL PLANT DEPARTMENT

FEED WATER TREATMENT

DWN. BY R.E.P.
DATE 13 NOV.
SCALE 1967.

FILE NO. LIFE SC.
SHEET 11 OF 12

DIVISION 5

ELECTRICAL

SECTION 1 - GENERAL REQUIREMENTS

1. Contractor must pay for his own electricity during construction.

2. Do not assume the University will provide, connect, or otherwise perform any services without specific prior agreement.

3. The University must schedule interruptions of services when Contractor wishes to make utility connections. Notify in writing Director of Physical Plant prior to time when interruption is planned. Interruption must be at University's convenience. Overtime, if required for this work, is to be at Contractor's expense.

4. Prior to placing a full load on the electric service, the University will be notified and the activation of the full loads into this service will be at a time agreeable to the University and under the supervision of University personnel.

5. No final Inspection by University will be conducted without prior delivery of performance data, spare parts lists, operating instructions, and equipment descriptive literature that contains complete numbered replacement parts list.

SECTION 2 - PRIMARY SYSTEM

1. Electrical power will be furnished by the Provo City Municipal Power Plant through transformer substations located on the campus. Distribution voltage is 4160V, 4-wire Y. The main line leading to a building shall be underground. Where electrical lines run parallel to heat tunnels, it is recommended that they be located outside of the tunnel where the heat will dissipate readily. In some cases where the tunnels are well ventilated and it is desirable to include all utilities, the electrical line may be located inside.

2. Primary cables shall have a manufacturer's rating of 5,000 Volts and shall be single conductor, triplexed in the factory, non-shielded copper conductors. It shall be made up with semi-conducting tape next to conductor oil base insulation equal to Okolite 90 and jacket equal to Okolon, as manufactured by the Okonite Company.

3. All high voltage splices shall be made in manholes or pullboxes by a skilled cable splicer using standard splicing kits furnished by the manufacturer of the cable and strictly in accordance with that manufacturer's written instructions. Personal supervision by a representative of the cable manufacturer

of at least part of the splices shall be required. Advance notice by the Contractor to both the cable manufacturer and the Engineer, of intent to make splices is required, in order that splicing supervision may be available at the job site.

4. Cable shall meet or exceed all current IPCEA requirements and be so certified to the Engineers. After cables are in place and splicing completed, but before connected to any equipment, a high potential test shall be applied. Test shall consist of applying a direct current potential in increments of 1,000 V to 5 KV and 500 V from 5 KV to 9.5 KV, by means of a Biddle, or equal, testing unit for a period of one minute at each setting, between conductor under test and all other conductors with system ground. Current leakage shall be logged at each voltage setting and the discharge time from 9.5 KV to 1 KV shall be logged for each conductor. Any resulting damage shall be corrected at Contractor's expense, and again retested until proven satisfactory. A certified copy of the final test results shall be provided to both Owner and Engineer.

SECTION 3 - SECONDARY SYSTEMS

In general, lighting systems and small single phase power shall use 120/208 volt three phase, four wire, alternating current. 277/480 volt will be considered for large installations; review with Director of Physical Plant.

SECTION 4 - TRANSFORMER VAULTS

1. Transformers for individual buildings shall be located wherever possible in underground well-ventilated, dry vaults outside of the building. When transformers must be located inside the building, transformer vaults must be arranged in relation to the other parts of the building such that transformers may be changed without the removal of permanently placed concrete or machinery. Access to transformer vaults through machinery spaces is acceptable. The transformer vault shall house the transformer and associated switching only.

2. Transformers shall be oil-filled type. Dry type shall not be used. Three phase banks shall be three single phase transformers connected Y-Y with the primary neutral properly connected to the common neutral of the distribution system. Primary and secondary neutrals shall also be adequately grounded at the transformer site with driven grounds and wherever possible with waterpipe ground.

3. There shall be a disconnect both on the primary and secondary sides of each transformer as follows:

   Primary - 200 Amp. G & W oil fused cutouts with proper size links.
   Secondary - Magnetic circuit breaker.

4. All work shall be in accordance with the National Electrical Code.

SECTION 5 - CONDUIT AND ELECTRIC METALLIC TUBING

1. Rigid aluminum conduit buried in concrete walls or slabs is prohibited. Exposed aluminum conduit is permitted in sizes 2-1/2" and larger.

2. Electric metallic tubing shall be used in partitions, ceilings, bar joists, and the like.

3. No home run conduit shall be smaller than 3/4".

SECTION 6 - WIRE AND CABLE

1. All conductors #2/0 AWG and smaller shall be copper. Aluminum in the larger sizes may be specified only if discussed with and agreed to by the Owner prior to publication of the specifications.

2. Feeders shall have type THW insulation except low voltage (32 V and below) wiring or where extreme heat or water conditions exist requiring special insulation.

3. No wire smaller than No. 12 AWG shall be used except for low voltage, signal, fire alarm, intercom systems and the like.

4. Main secondary feeders to lighting and power panelboard shall be sized to include 50% future additional capacity at original design voltage drop.

5. Branch circuit conduits between outlets and also between outlets and distribution panelboards shall not have more than four wires on 120/208 volt systems.

SECTION 7 - WIRING DEVICES

1. Wall switches shall be 20 Amp. capacity, Hubbell or Bryant No. 4901-I for single pole or 4903-I for three way, or equal.

2. Duplex convenience receptacles shall be Hubbell or Bryant No. 5262-I or equal.

3. Cover plates shall be stainless steel unless architectural treatment requires special types.

SECTION 8 - POWER AND LIGHTING PANELS

1. In general, power and lighting panels shall be provided with 50% spare capacity. Flush-mounted panels shall be provided with spare conduits stubbed into accessible areas above and/or below sufficient to wire in spare capacity of the panel.

2. All breaker panels shall have bussing complete, ready to receive breakers.

3. Directories for panelboards and the like shall be made after the permanent room numbers are installed on the doors and shall use these numbers rather than the numbers on the construction drawings. Information to be typewritten.

SECTION 9 - METERS

Each building shall be wired and equipped with demand type watthour meter. A three element meter such as G. E. type VM-64 with VM-30 indicating demand register, or equivalent shall be used.

SECTION 10 - LIGHTING FIXTURES

1. The number of different types of fixtures shall be held to the minimum compatible with the architecture.

2. Electrical specifications shall include a light fixture schedule.

3. Four (4) foot fluorescent light tubes are preferred; eight (8) foot tubes are to be avoided.

4. Perforated or egg crate type light fixture lens should be avoided because of the inherent cleaning problems. Light fixtures requiring special bulbs should be avoided.

5. Polystyrene light lenses are not acceptable in permanent buildings. Acrylic is preferable.

6. Specify fluorescent light tubes to be cool white.

SECTION 11 - CLOCK AND BELL SYSTEM

1. All clocks shall be Simplex.

2. Unless otherwise specified, all clocks shall be Type 77, semi-flush, 12" round clock.

3. All clocks shall be mounted in a Type 5957 outlet box with hanger strap for 12", 15" or 18" clocks.

4. Attendance recorders shall be Simplex Model 8900.

5. Installed six inches below each attendance recorder and connected to it with two 1/2" conduits should be a 629-I relay with 115 VDC output.

6. All bells, unless otherwise specified, shall be Simplex, semi-flush type, 115 VAC, and mounted in a Type 5917 outlet box.

7. All clock and bell wiring shall be in 3/4" conduit and installed in strict compliance with B. Y. U. color code.

DIVISION 6

FIRE AND SAFETY REGULATIONS

The following outline spells out in a general way the requirements for fire protection to be incorporated into all future buildings on the Brigham Young University Campus.

SECTION 1

1. All buildings shall be classified according to their specific use and planned in accordance with the Uniform Building Code, latest edition. Where, in any specific case, different sections of this Code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

SECTION 2

1. Each building located on the main campus shall be equipped with Autocall Fire Alarm Equipment, and tie into the existing campus alarm system. Wire sizes shall be calculated in conjunction with the Autocall Company representative and the Brigham Young University Physical Plant Department. There shall be a color code as specified by the University Physical Plant Department. All fire alarm equipment shall be compatible with the equipment we are now using and shall be installed so as to use the reserve power from the central reporting station in case of a power failure.

SECTION 3

1. Standpipes will be located in the buildings in accordance with Uniform Building Code, latest edition, in Chapter on Fire Extinguishing systems. Installation of fire protection system shall be in strict accordance with the requirements of National Board of Fire Underwriters Pamphlet No. 14.

2. Sprinkler systems shall be installed in areas where specified in Chapter on Fire Extinguishing systems of the Uniform Building Code, latest edition. All sprinkler systems shall be constructed (size, material, proper testing, and tagging) in accordance with the "Standard of the National Board of Fire Underwriters." Pamphlet No. 13. All fire department hose connections to be labeled as directed in this pamphlet.

3. All sprinkler systems are to be equipped with water flow indicators as manufactured by the Autocall Company, have the proper alarms, and wired into the Master Printer through the fire alarm equipment.

SECTION 4 - TESTING

1. All new systems, including yard piping, shall be tested hydrostatically at not less than 200 lbs. per square inch pressure for two hours, or at 50 lbs. per square inch in excess of the normal pressure when the normal pressure is in excess of 150 lbs. per square inch.

SECTION 5 - SIZE OF WATER CONNECTION TO BUILDING

1. All interior wet standpipes shall be connected to a street water main not less than four inches (4") in diameter. If they are connected to the main water supply for the building, that main supply should be at least four inches (4") in diameter.

SECTION 6

1. Where hose cabinets are located they shall be equipped with 1-1/2 inch valves with 75 feet of linen hose and nozzle. Also, a water extinguisher of stainless steel, 2-1/2 gallon size, pressurized water type, using air pressure with air charging valve and pressure gauge, U/L labeled for A-1 fires. These are to be anti-freeze type if they will be subject to freezing.

2. In all equipment rooms, mechanical rooms, and electrical transformer rooms there should be a 15 lb. CO_2 fire extinguisher. These are to bear the label of the U/L. Also, there should be a 10 lb. CO_2 in the fan room in the penthouse and the elevator room. There should be a 5 lb. CO_2 in all the telephone and transformer rooms on each level of any building. In special areas, where there is dispensing and discharging of flammable liquids, there will be need of "dry powder" extinguishers. These will be of a cartridge type. All equipment should be approved by the Brigham Young University Fire Marshall of the Department of Physical Plant before being placed to make sure it is consistent with standards and existing equipment.

3. All extinguisher cabinets in dormitories are to be locked-type with a break glass panel in the door and with no vent slots under or above the locking mechanism. In all academic buildings, they can be of the open type with full view doors.

SECTION 7 - VERTICAL ENCLOSURES

1. All vents, shafts, and other vertical openings shall be enclosed in accordance with the Uniform Building Code.

SECTION 8 - CORRIDORS AND EXITS

1. All corridors will conform to size, building material, and basic design as outlined according to group occupancy and in accordance with Uniform Building Code. Exits will be equipped with the hardware as stated in the Uniform Building Code for all exits and doors in the building.

SECTION 9

1. All electric motors and equipment shall be equipped with the latest thermo protective devices and in accordance with proper electrical standards.

SECTION 10

1. All fire extinguisher systems, including automatic sprinklers, wet and dry standpipes, automatic chemical extinguishers, basement pipe inlets, and the appurtenances thereto, shall meet the approval of the Brigham Young University Fire Marshal and the Provo City Fire Chief as to location, size, and installation.

SECTION 11

1. All pipe thread size will conform to the City of Provo specifications. They are as follows:

    a. All 2-1/2 inch threads to be hooked into hose will be National Standard Size Thread. All 1-1/2 inch threads, which will receive a hose and nozzle, are to be Iron Pipe Thread, 11-1/2 threads to the inch.

SECTION 12

1. In buildings where no standpipe protection is installed, fire extinguishers should be located in recessed cabinets and so located that a person will not have to travel more than 50 feet from any point to reach the nearest unit. This is a flexible rule and the class of occupancies will determine more or less this rule.

DIVISION 7

DOOR NUMBERING SYSTEM

SECTION 1 - GENERAL

1. In order to identify rooms, control keys, and maintain doors and locks a system of door numbering has been developed for the Brigham Young University Campus and elsewhere in the Unified Church School System. Doors which must be identified for the public shall have a number plaque attached above the door, either on the casing or just above. It shall not be on the door. All other doors shall be identified with a number stamped in small print on the frame, just above the top hinge. Before working drawings are completed, the Architect is requested to provide the Owner with two sets of floor plans (blue or black line prints), system described below, and indicate which are to have identifying plaques and which are not. One set will then be returned to the Architect who will incorporate this information into the plans, preferably into the door schedule.

2. The Architect may assign room numbers, letters, or whatever is expedient to facilitate construction of the building, but when the building is completed it shall have the door number plaques attached as designated. A laminated plastic plaque with routed letters one inch high is recommended. This plaque shall be attached with screws.

3. The system of door numbering as outlined below is not intended as a complete solution to every problem which will arise. Each building is a problem of its own. The rules, as spelled out, should be followed in a general way, making necessary deviations where common sense demands. The following outline is included here to assist in the standardization of door numbering on the various campuses of the Church School System. As stated above, it is the Owner's responsibility to designate a number for each door and the Architect's responsibility to see that this information is conveyed to the Contractor on the working drawings.

SECTION 2 - BASIC RULES FOR NUMBERING DOORS

1. In a multi-floor building each floor shall be assigned a block of 100 numbers. If one or more floors has more than 100 doors, then each floor shall be assigned 1,000 numbers. The lowest floor that is accessible to the public shall be assigned numbers 100 to 199; the next floor, 200 to 299; and on up to the top floor. If, as stated above, there are more than 100 doors on one floor, the first floor shall start with 1,000 and go up to 1,999; the second, 2,000 to 2,999, and so on. This rule applies regardless of the level at which one enters the building.

2. This block of numbers shall be distributed evenly over the entire floor. In a simple rectangular building the numbering should begin at one end and arrive at the top of the assigned block of numbers for that floor at the other end, similar to the way houses are numbered on a city block, putting even numbers on the right and odd numbers on the left as one proceeds down a corridor. Where the shape of the building is irregular, the numbering shall be done in this same manner where possible, being very careful to keep numbers within groups so that direction signs may be posted. In a building with well defined wings it is desirable to add a prefix letter to the 3-digit door number designating the individual wing. This is easier to locate and remember than a 4-digit number. As a further safeguard against confusion, the numbers in each wing should be different as well as the prefix letter. This can be done only where doors on a floor do not exceed 100.

3. Doors which do not open into a corridor shall be assigned the same number as the door opening into the corridor in that same room with the addition of a suffix letter. Thus, the doors into four offices from a secretarial area which has a door into the corridor which is numbered 129 shall be numbered 129-A, 129-B, 129-C, and 129-D.

4. Rooms with more than one door opening onto a corridor shall be designated with only one plaque located over that door which is most desirable as an entrance, the other door serving as an exit only and designated by the small stamped number on the frame.

DIVISION 8

WATER MAINS AND SUB MAIN LINES AND FITTINGS

SECTION 1 - TYPE OF PIPE AND FITTINGS TO BE USED IN MAIN LINES

1. All exterior water mains four inches (4") and larger shall be Standard Bell and Spigot Cast Iron Pipe, Class 150, as described in Federal Specifications WW-P-421.

2. Joints shall be the "Mechanical Type" as described in "American Waterworks Association" bulletin C111-53 for pressure pipe and fittings; or the "Tyton Joint" using a single gasket to affect the joint seal.

3. The only place where lead caulked joints will be allowed is when a connection is made to an existing lead caulked line, and even in this instance after the connection has been made water tight, it is recommended that "Style 60 Dresser Adjustable Bell Joint Clamp" be used in addition to the lead caulking.

4. Valves four inches (4") and larger shall be cast iron, bronze mounted, parallel seats, double gate, non-rising stem, and conform to Federal Specifications WW-V-76, and WW-V-58, and have a full opening equal to the inside diameter of the connecting pipe.

5. All water mains which connect to a municipality main are to be connected with the consent and under the direct supervision of the municipality and where possible this work is to be done by the Waterworks Department which serves the community.

6. Fire hydrants shall be of a type which will meet the approval of the local fire department, and if the water main serving the fire hydrant proposed is six inches (6") and larger, then the fire hydrant must be a 6-inch flange connection with 6-inch auxiliary valve connected. The fire hydrant must have two hose and one steamer nozzle, all of which must meet the local fire department thread standard. The fire hydrant shall meet the latest American Waterworks Association specifications in all respects and shall have a 5-inch valve opening in the hydrant.

SECTION 2 - PIPE AND FITTINGS USED IN SUB MAIN LINES

1. All pipe used in sub mains shall be seamless, galvanized, Class 150, threaded and coupled steel pipe, and must meet the "American Waterworks Association" latest specifications for galvanized pipe and fittings for water lines.

SECTION 3

1. Where water softeners are required, a storage facility shall be provided. The larger installations, such as a cafeteria, shall have this salt storage facility accessible to delivery trucks and it shall be located adjacent to point of usage.

2. Connections to the cast iron water main by a smaller threaded line shall meet all standard specifications covering the tapping of a water main for connecting smaller service lines, and where necessary, a service clamp or saddle must be used on the cast iron main and a lead gooseneck or short length of copper pipe must be used between the cast iron water main and the galvanized sub main. Where the galvanized pipe is too large to make a tapped connection into the side of the cast iron water main, then a tapped tee must be placed in the cast iron water line so that the threaded end of the sub main pipe can be threaded into the cast iron tee.

DIVISION 9

SEWER LINES AND CONNECTIONS

SECTION 1

1. Sewage lines on the Brigham Young University Campus are installed and maintained by the University; this would generally be true at other Church schools. The sewer mains are connected to the City mains at different locations, but it is necessary that contact be made with the City prior to any contemplated definite design of sewage systems as the design of the City sewer system may not allow the extra flow of sewage to be concentrated at the most advantageous point so far as the school is concerned.

SECTION 2

1. All plumbing installed inside of any building must meet both the "Uniform Plumbing Code" and the local "City Plumbing Ordinance" and extend to a point at least five feet (5') outside of the outside wall of the structure where it will be connected to the outside sewage system. In areas of the building where it is expected that temperatures may exceed 75° F. asbestos rope shall be used in place of oakum for caulking cast iron pipe or other types of pipe joints.

2. Material:

   The outside sewage system shall consist of one of the following materials: Concrete pipe, Transite pipe, or Vitrified Clay pipe. The joints must be placed so that the bell is upstream.

   a. Concrete Pipe: If concrete pipe is used, it must conform to the following standards: The concrete pipe shall comply with all physical and dimensional requirements as set forth in ASTM Specifications C14-57, and the pipe can be standard or extra strength according to depth or traffic. The joints shall be of the bell and spigot type, and the joint shall be so designed as to provide for self-centering and where assembled to compress the gasket to form a water-tight seal. The gasket shall be confined to a groove on the spigot end of the pipe so that it cannot be displaced by movement of the pipe or by hydrostatic pressure.

   b. Transite Pipe: If asbestos cement pipe is used for sewage system, the material shall be as shown in Johns-Manville pipe by specification No. DS-366-61, and the installation shall meet specification No. DS-370-61.

   c. Vitrified Clay Pipe: If clay pipe is used, it must meet the latest specifications for the manufacture of Vitrified Clay as shown in ASTM Specifications, and the joints must be of the bell and spigot type with double ball plastisol joints. The plastisol shall consist of plasticized polyvinyl chloride resins with suitable fillers and plasticizers and the joint shall be factory made and placed on the pipe prior to delivery of pipe to project.

3. Installation:

All sewer and storm sewer pipe shall be installed in direct compliance with approved practice and in complete accord with the manufacturer's instructions. The bedding of all sewer pipe shall be in bank run sand having the following graduations: 100% passing a 3/4-inch screen, and 90% passing a 1/4-inch screen. The sand shall be placed around pipe so that it completely envelopes the pipe except at the joints which are to be left exposed until after the pipe has been tested by water after which the joints are to be covered with sand also.

4. Testing for Leakage:

After the sewer line has been installed it must be tested for leakage as follows: The pipe must be plugged at the lower end or manhole and filled with water to at least one foot above the upper end of the pipe; the water must maintain this static level for two (2) hours without losing more than 1% of the water by volume.

DIVISION 10

AUDIO, RADIO, AND VIDEO EQUIPMENT

SECTION 1

1. Facilities shall be provided to adequately meet the needs of audio, radio and video equipment as it will be used in each building. The Brigham Young University has a Department of Audio Visual Communications which is responsible for the operation and maintenance of sound equipment, movie projectors, etc. The following information outlines in a brief way the general requirements to be met in planning for this equipment. The Architect is instructed to contact the Physical Plant Department for more detailed information.

2. The microphones, amplifiers, speakers, and associated wiring will be included with furniture and equipment and shall not be a part of the general contract.

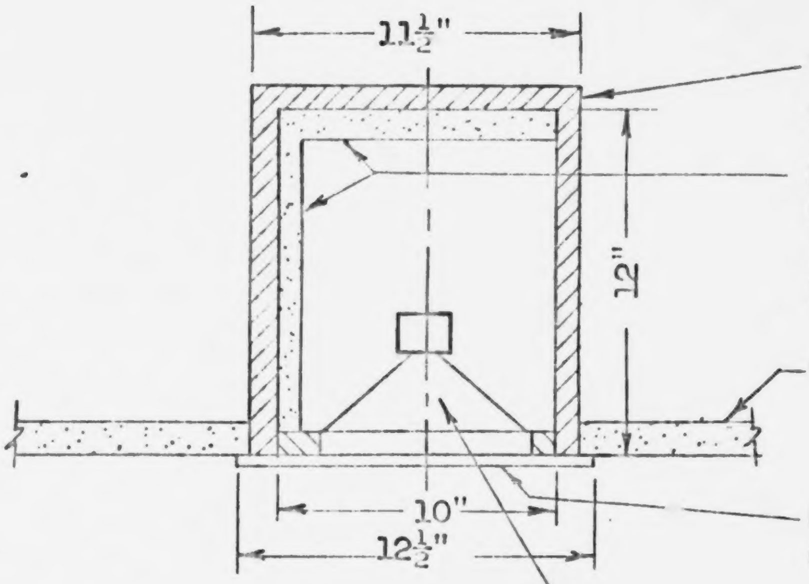
3. The Electrical Contractor shall provide and install all conduit, conduit fittings, boxes, etc., necessary for the complete sound and video systems. No jacks, plugs, or wire shall be a part of his contract. All junction and terminal boxes shall be complete with a blank cover plate of proper appearance. No conduit shall be smaller than 3/4-inch. Separate conduits and junction boxes shall be run for microphones and speakers. For the guidance of the sound contractor, the electrical contractor shall identify all conduit installed for the sound system at all terminations and junction points. Riser diagrams and drawings showing the locations of all conduit runs and junction boxes shall be included in the working drawings of the building. The Owner shall be provided with "As-Built Drawings" of all conduit runs, raceways, junctions, etc. of the audio and video systems, in accordance with the "General Conditions".

4. Microphones and amplifiers shall not be included in the general contract as stated above. The "Cannon XLR Series" microphone plug is standard on the BYU Campus. All microphone lines shall run individually back to the amplifier location; conduits shall be sized accordingly. Amplifier cabinets shall be included in the contract. It is essential that amplifier cabints be well ventilated so that the amplifier will not overheat even when the cabinet is closed. To attain this end it is recommended that the entire back and both sides of the cabinet space which houses the amplifier be made of expanded metal, and that the shelf on which the amplifier rests shall also be of expanded metal. Where an amplifier is in an enclosed cabinet a pilot light and master switch shall be installed on the outside of each amplifier storage cabinet by the electrical contractor. It shall be located where it can be readily seen.

5. A power outlet shall be provided by the electrical contractor for each amplifier immediately adjacent to the amplifier. This circuit shall run from the electrical power panel through the master switch on the outside of the amplifier cabinet to the outlet near the amplifier and carry no other electric load. It shall be protected with a 15 to 20 ampere circuit breaker. Where possible these circuits shall be on the emergency power system of the building.

6. Loudspeaker enclosures, including grille and all cabinet work, shall be included in the contract. Speakers, however, shall be excluded. The ceiling recessed loudspeakers shall be mounted in cabinets constructed as shown in the enclosed drawings. Each cabinet, other than the ceiling recessed cabinets which use the Lowell JG grill, shall be equipped with a grill frame, covered with Newcastle Fabrics "Acoustone" woven plastic cloth, and may include decoration as specified. Conduit lines going into loudspeaker enclosures may be stubbed into them with no terminating box being required. Where these cabinets are ceiling recessed, the cabinets shall be completely framed so as to form an air-tight draft barrier between the room and attic. All cabinets and enclosures are to be constructed of plywood, 3/4-inch minimum thickness. The exposed surfaces of the surface-mounted enclosures shall be constructed of hardwood and/or hardwood veneer plywood that will match the adjacent building woodwork and shall be finished to match. All surfaces of the loudspeaker cabinets behind the grill shall be painted flat black.

Section 6. Recessed mounted cabinet for 8" loudspeakers.



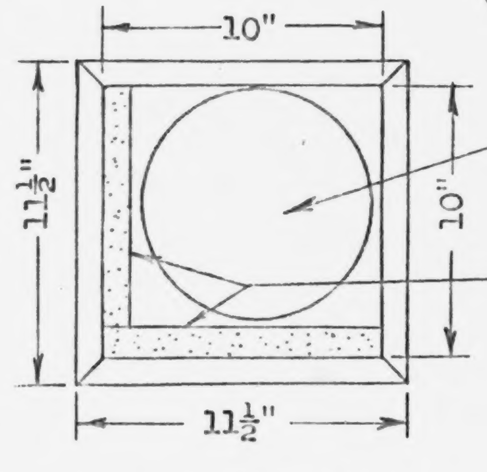
Use 3/4" plywood for construction of box.

Sound insulation on top and two adjacent sides of box interior. Microlite #310 1" thick.

Ceiling or wall.

Grill and frame Lowell JG8D or Soundlier 164-8.

SECTION



8" Loudspeaker not included in contract.

Sound insulation, see note above.

BOTTOM VIEW

Scale: 1½" 1'0" July 21, 1961

DIVISION 11

TELEPHONES

SECTION 1

1. All telephones on the Brigham Young University Campus work through a main campus switchboard located in the Smith Family Living Center. Interior telephone communication is preferred over other inter-communication systems.

SECTION 2

1. Provision for public phone booths of a flush mounting type shall be located in corridors, entrance foyers, and other logical places in each building for the convenience of students and visitors.

DIVISION 12

CLOCKS AND CLASS BELLS

SECTION 1

1. All clocks and class bells on the Brigham Young University Campus are controlled by the master clock which is located in the Physical Plant Building. The control impulses are conducted over an existing wiring system to all buildings.

2. The Architect will be informed by the Physical Plant Department at which point he shall connect the lines from a specific building to this campus circuit.

SECTION 2

1. The Architect shall provide the Brigham Young University with "As-Built" wiring diagrams of the clock and bell circuits in the building which he has designed upon completion of that building.

DIVISION 13

SPRINKLER SYSTEMS

SECTION 1 - PIPE LINES

1. All pipe and fittings shall be of American manufacture. All pipe except 3/8" size shall bear a stamped marking "Made in U. S. A." and shall also show name of U. S. manufacturer. All fittings shall bear U. S. manufacturer's marking. All pipe and fittings shall be delivered to the job site no less than 48 hours prior to installation and must be checked by Owner prior to installation. No. 1/2" pipe shall be permitted except for risers.

2. All lines shall be drained to the main valves where possible. All lines must be sloped to a drain. A minimum of drains should be used. Extra drain valves necessitated by unforeseen field conditions shall be provided by the Contractor and approved by the Owner.

3. Sprinkler lines shall be looped wherever possible to eliminate dead ends which become clogged and to assure adequate supply of water to all heads.

4. Proper watertight seal against the weather shall be provided for lines which penetrate building or planter box walls.

5. All drains shall be marked by engraving in sidewalk in an approved manner.

6. A suitable gravel sump having a minimum depth of 24" shall be provided for each drain a minimum of 6" below the finished grade.

SECTION 2 - VALVES

1. All valves and drains shall be encased in some suitable type of valve box. Valve boxes shall be located 1-1/2" to 2" below the sidewalk level for lawn mower clearance, except for concrete valve boxes which shall be set adjacent to and at the sidewalk level.

2. A minimum of one key shall be provided for each size valve. The campus standard of a 2" square nut on valves shall be met wherever practical.

3. All valves should be globe type. Gate valves may be used only in instances where they will be shut off or turned on not more than twice a year and are repairable without removing the valve.

4. All valves shall have unions close enough to permit easy removal and replacement.

SECTION 3 - HEADS

1. A full head shall not be placed so that under full pressure it would spray closer than 6 feet from a building. Large diameter sprays should not spray within 20 feet of a building. Large diameter sprays are not to be used in any area where they will interfere with pedestrian traffic.

2. Half sprays, wherever possible, should not be spaced more than 10 feet 6 inches apart and full circle sprays should not be spaced more than 14 feet 0 inches apart.

3. All corners should be covered by quarter circle spray or two half circle sprays not more than 5 feet each way from the corner.

4. Sprinklers around window wells must be planned and placed so that water will not be sprayed into them.

5. Bubbleheads should be used for planter boxes and other areas where regular sprinkler and shrubbery heads are not practical. Where bubbleheads are connected to a spray system a manual globe valve shall be installed to control the bubbleheads separately from the rest of the system. Bubbleheads should not be used for areas where the grade exceeds 2 per cent.

6. Initial placing of spray heads except those adjacent to the walks shall be 3" to 4" above finished grade. The Contractor shall set heads at finished grade after the second cutting of grass. Initially, heads next to walks shall be placed 3/8" below, and not more than 2" away from the walk. All bubbleheads shall be installed at the finished grade.

7. Fixed sprays, as manufactured by the Thompson Sprinkling Company or Aqua-Dial Company shall be used. Full fixed trays should not be larger than the Thompson "b" heads, which have a 5/16" opening. Small fixed sprays shall have a brass body, not zinc or copper alloy castings.

SECTION 4 - CONTROLS

1. Automatic controllers shall possess the following features:

    a. 12-hour clock, six-day wheel, push-button solenoid motor, one switch for solenoid and one switch for motor, working program shall be adjustable in increments of 2-1/2 minutes or less; or

    b. 24-hour dial, 14-day program wheel, manual control for motor, individual station settings variable in 10 increments from OFF to 60 minutes.

2. Controllers may be installed in one of two ways as per instructions from the Department of Physical Plant:

    a. Pedestal mounted type installed adjacent to the south exposure of a building. Provide separate electrical circuit in conduit to controller location.

b. Preferred installation for large structures is a recessed 20" x 36" x 6" electrical can on the south exposure 18" above finished grade with two 24 rigid conduits extending from the base of the can down 18" below finished grade and out with a 90° factory bend. Copper tubing shall connect the lines at the controller to the 3/8" galvanized control lines at the end of the rigid conduit below grade. Location and details of installation subject to approval by the Department of Physical Plant.

3. Each control line shall be tagged with a stamped brass metal tag attached to the galvanized pipe with a rustproof key chain showing the circuit number and indication of the location of the area controlled by the line. (See utility identification specification, Division A). Each copper tube at the controller shall be numbered to match galvanized circuits. Inasmuch as control lines on controller are numbered according to a factory system, we should use these same numbers to identify the galvanized pipe control lines.

4. The controller pressure line shall be connected to the supply line between the main control valve and the culinary main. A stop and drain valve is to be installed at its point of attachment to supply line. A shut-off cock is to be installed on end of galvanized supply line where it is connected to copper tubing in metal box. (See Section 4-2).

5. Quarter-inch air cock with standard air hose thread on end shall be installed in place of 1/4" plug on distributor valve at controller to facilitate blowing out control lines with compressed air.

6. The system should be designed so that there is only one master control valve for the system, or if the system is a large one, that there be only one master control valve for each major section of it.

7. The systems should be designed so as to permit separate sprinkling of north exposures from south exposures.

8. The power supply to each controller shall be in accordance with the National Electrical Code and local codes to be obtained from the Owner's representative. Wiring to the controller must be properly encased in standard metal conduit.

9. A panel having an "as-built" one line drawing showing the general area served by the control valve and where all valves are located, including system numbers and control valves, shall be engraved in plastic and mounted in the controller door. (See utility identification specification, Division A.)

10. Automatic valves and controllers shall be Aqua-Dial or approved equal.

SECTION 5 - GENERAL

1. Provision should be made for the installation of lines under sidewalks and other paved areas so that tunneling or driving will not be required after the pavement has been constructed.

2. Use pipe dope on all risers. Do not use a wrench larger than 10" on risers.

3. All pressure lines to control valves shall be placed after sub-grade is established and before top soil is placed. All trenches must be compacted or watered in. Lines from control valves to be installed after top soil is in place and properly graded.

4. Design of the sprinkling system and planting plan should be integrated together to facilitate the best coverage of all areas.

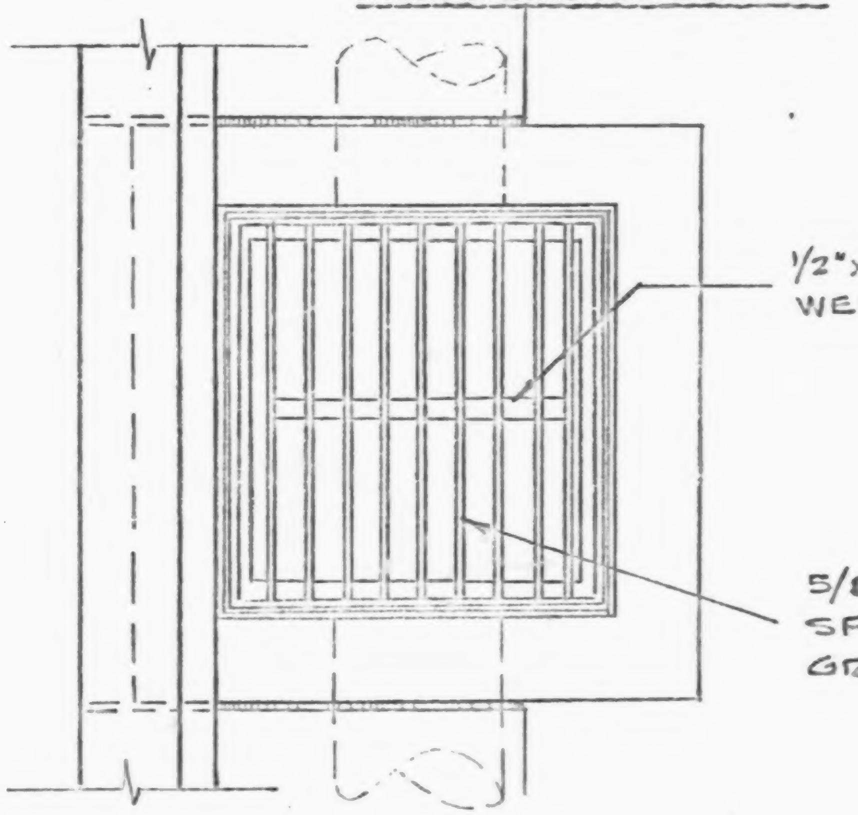
5. Scale for sprinkling drawings shall be 1" equals 10' or 1" equals 20'.

6. Each system on each sheet of the sprinkling plan shall be labeled and colored. A key map showing the area covered by each sheet shall be labeled and provided.

7. Plans for each sprinkling system shall be examined by all concerned at this institution and properly approved by them.

8. The Contractor shall furnish complete operating instructions to the Owner's representative at the completion of construction.

9. The Contractor shall also furnish to the Owner's representative one set of plans marked with colored pencil showing any changes that were made. ("As-built plan.")

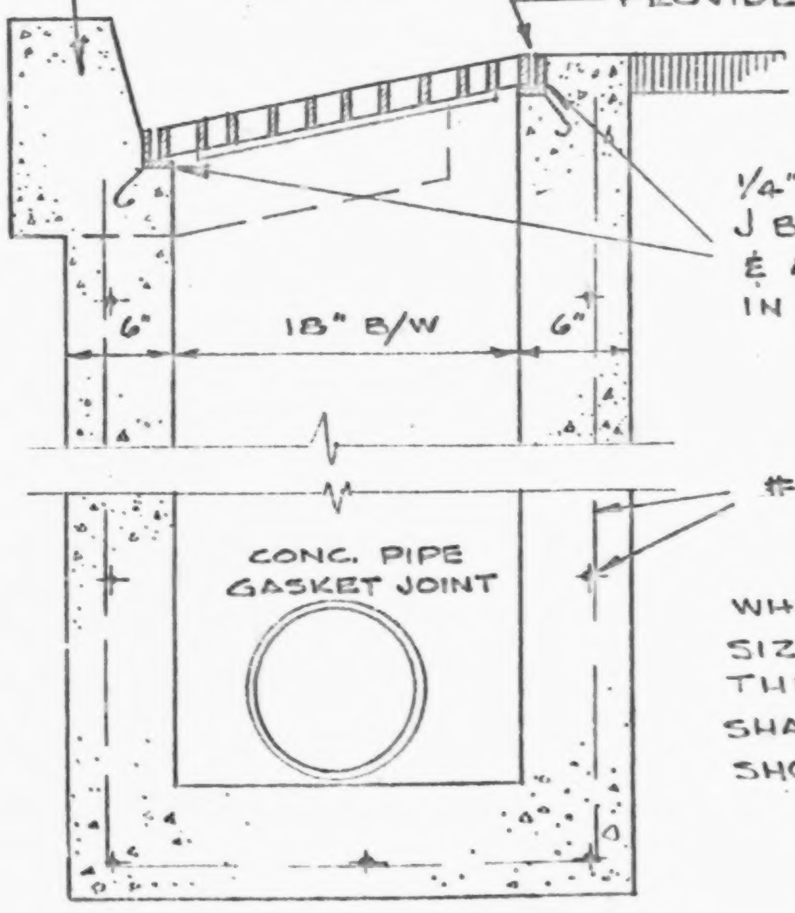


1/2" X 1" STIFFENER WELDED TO BOTTOM.

5/8" X 1 3/4" BARS @ 1 3/4" SPACING IN THE CLEAR. GRATE TO BE 20 1/4" X 20 1/4".

PLAN

THIS CATCH BASIN TO BE IN ROADWAYS & PAVED AREAS WHERE TRAFFIC EXISTS.



TYPICAL C&G

PROVIDE 1/8" CLEARANCE ON GRATING

1/4" X 1 1/2" X 2" ∠ FRAME WITH J BARS WELDED ON CORNERS & ANCHORED SECURELY IN CONCRETE.

#4 BARS @ 12" O.C. B/W'S.

WHERE PIPES OF DIFFERENT SIZES ENTER CATCH BASIN, THE TOP ELEVATION OF PIPES SHALL BE THE SAME. UNLESS SHOWN OTHERWISE ON PLANS.

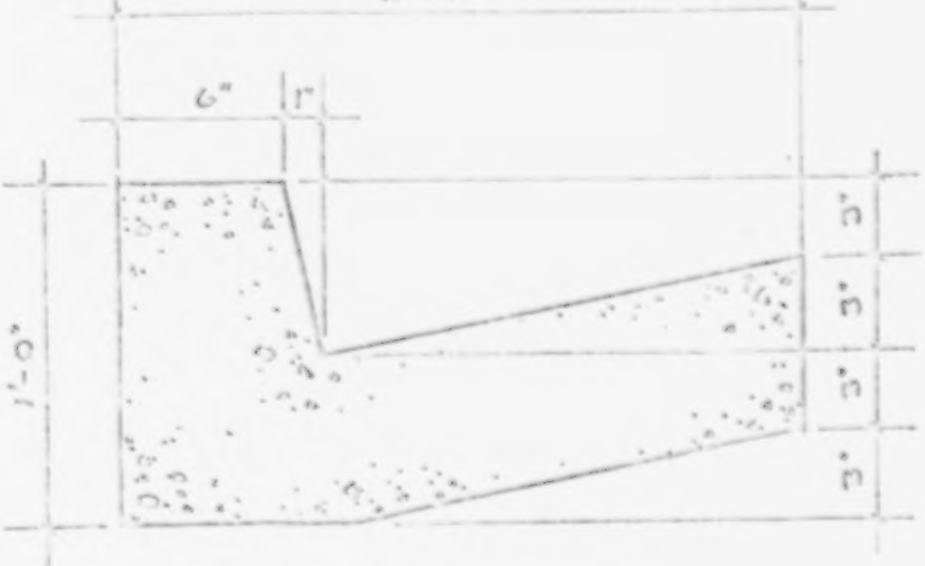
SECTION

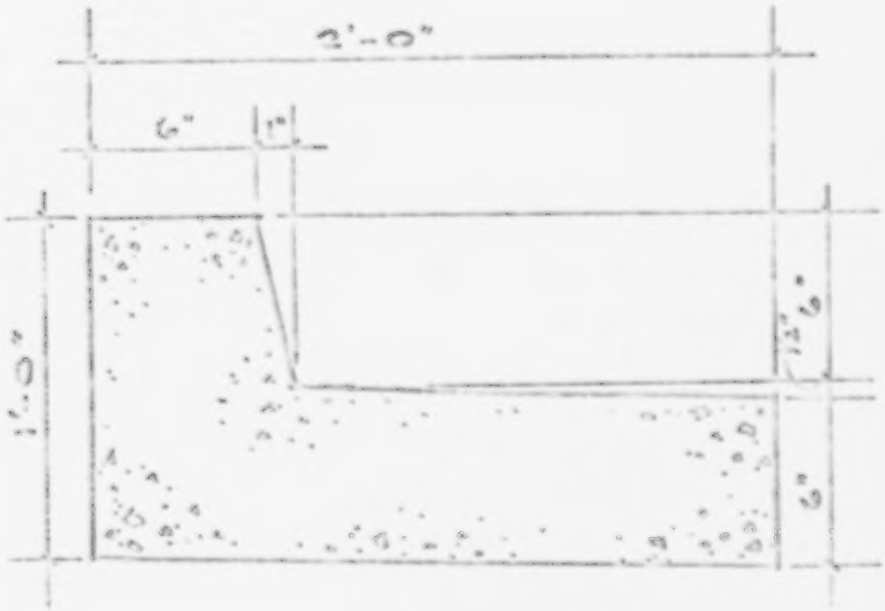
CATCH BASIN STANDARD

BRIGHAM YOUNG UNIVERSITY SCALE 1" = 1'-0" 21 FEB. 61

DIVISION 14

CATCH BASINS AND GUTTERS

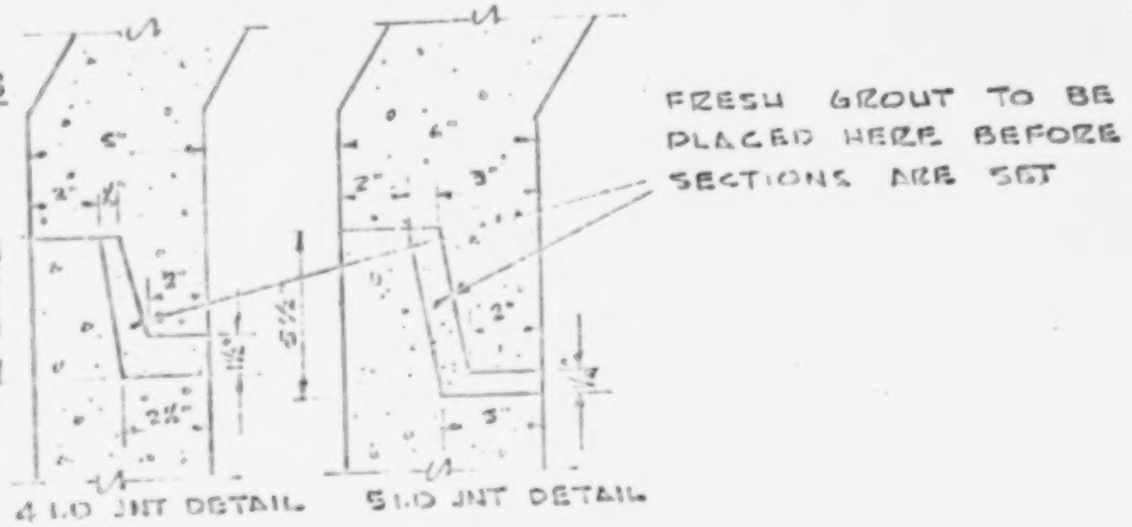




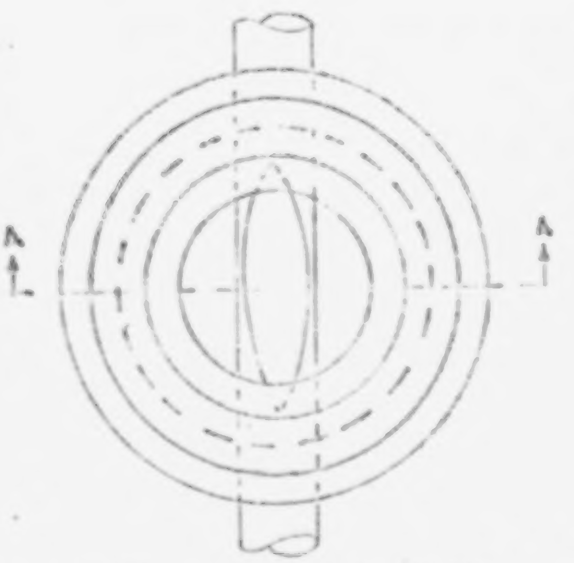
THIS TYPE TO BE
USED ONLY IN
PLACE OF VERTICAL
CURB OR WHERE
DRAINAGE AWAY FROM
CURB IS DESIRED

CURB & GUTTER STANDARD

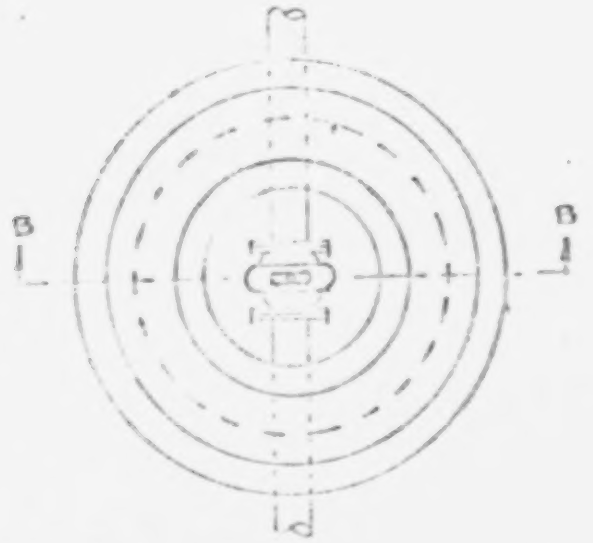
BRIGHAM YOUNG UNIVERSITY SCALE 1½"=1'-0" 22 FEB. 61


5"
2"
1/4"
2"
4 1/2"
1/2"
2 1/2"
6"
2"
3"
5 1/2"
2"
3"
1/2"
FRESH GROUT TO BE PLACED HERE BEFORE SECTIONS ARE SET

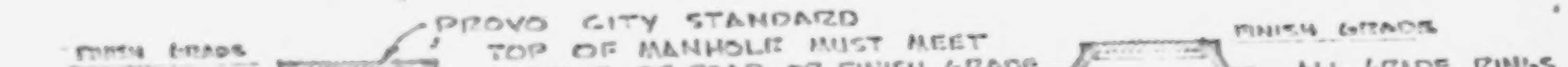
4 I.D JNT DETAIL 5 I.D JNT DETAIL



SEWER MANHOLE PLAN



WATER VALVE MANHOLE PLAN


FINISH GRADE
PROVO CITY STANDARD TOP OF MANHOLE MUST MEET SURFACE OF ROAD OR FINISH GRADE
GRADE RINGS IF NEEDED
FINISH GRADE
ALL GRADE RINGS & LID RING TO BE WATER TIGHT
24"
6"
25 1/2"
6"
3'-0" HEIGHT CONE
4"
4"
3/4" LADDER, RUST PROOF RUNGS TO BE CAST IN CONE SECTION WHERE M.H. IS OVER 6' DEEP
1'-2'-3'-4' SECTIONS AS REQUIRED
4'-0" OR 5'-0" AS SPECIFIED
5" OR 6"
5" OR 6"
4'-0" OR 5'-0" AS SPECIFIED
CAST-IN-PLACE BASE UNIT
NOT LESS THAN 4"

SECTION A-A SECTION B-B

SEWER & WATER VALVE MANHOLES

BRIGHAM YOUNG UNIVERSITY NOT TO SCALE 22 APR 64

DIVISION 15

TRASH AND GARBAGE REMOVAL

SECTION 1

1. A sheltered dock shall be constructed in an inconspicuous place adjacent to the service entrance of each building. A garbage can enclosure shall be located adjacent to the dock and to the service entrance with a floor at each dock level. The number of cans to be housed in each enclosure will vary with the size and the function of the building.

SECTION 2

1. Incinerators or trash chutes are not to be included in any new building on this campus unless specifically called for in the Program Requirements. Trash and garbage will be hauled away from the buildings daily and disposed of off campus.

DIVISION 16

RESTROOMS AND EQUIPMENT

SECTION 1

1. In order to maintain dispensers and other equipment more efficiently it is necessary to standardize on certain brands and models. The Architect is requested to specify the following items:

   a. Powdered soap dispenser shall be Zellerbach #702 or Bobrick #12, with either a stainless steel or a chrome finish.

   b. Toilet tissue dispensers shall be Zellerbach #702 or Bobrick #12, with a stainless steel or a chrome finish.

   c. Sanitary napkin dispensers shall be Kotex, Model MW-15, white enamel.

   d. Sanitary napkin disposal unit shall be Mipro #811, Wall type, white enamel.

   e. Paper towel dispensers shall be single fold type, 10-inch towel width, Shoreline white enamel.

SECTION 2

1. Each restroom shall have individual forced ventilation to the outside of the building. Toilets and urinals are to be of a wall-hung type. Urinals shall have a high standing water level, similar to toilets. Individual enclosures shall be attached to the wall, floor and ceiling. Restrooms are to serve both students and faculty. All fixtures shall be provided with control stop valves, with wheel handles on both hot and cold water supplies. All lavatories shall be wall-hung and shall have mixer type faucets. No spring type valves are to be used on lavatories and sinks. Restrooms are to be equipped with an adequate number of paper towel dispensers. Soap dispensers shall be mounted over the lavatories in such a way that soap powder will not fall on the floor or on chromed fixtures. Paper towel dispensers and electric hand driers shall be located away from the lavatories. Mirrors shall be located away from the lavatories. A shelf shall be installed in each restroom where students' books can be placed.

DIVISION 17

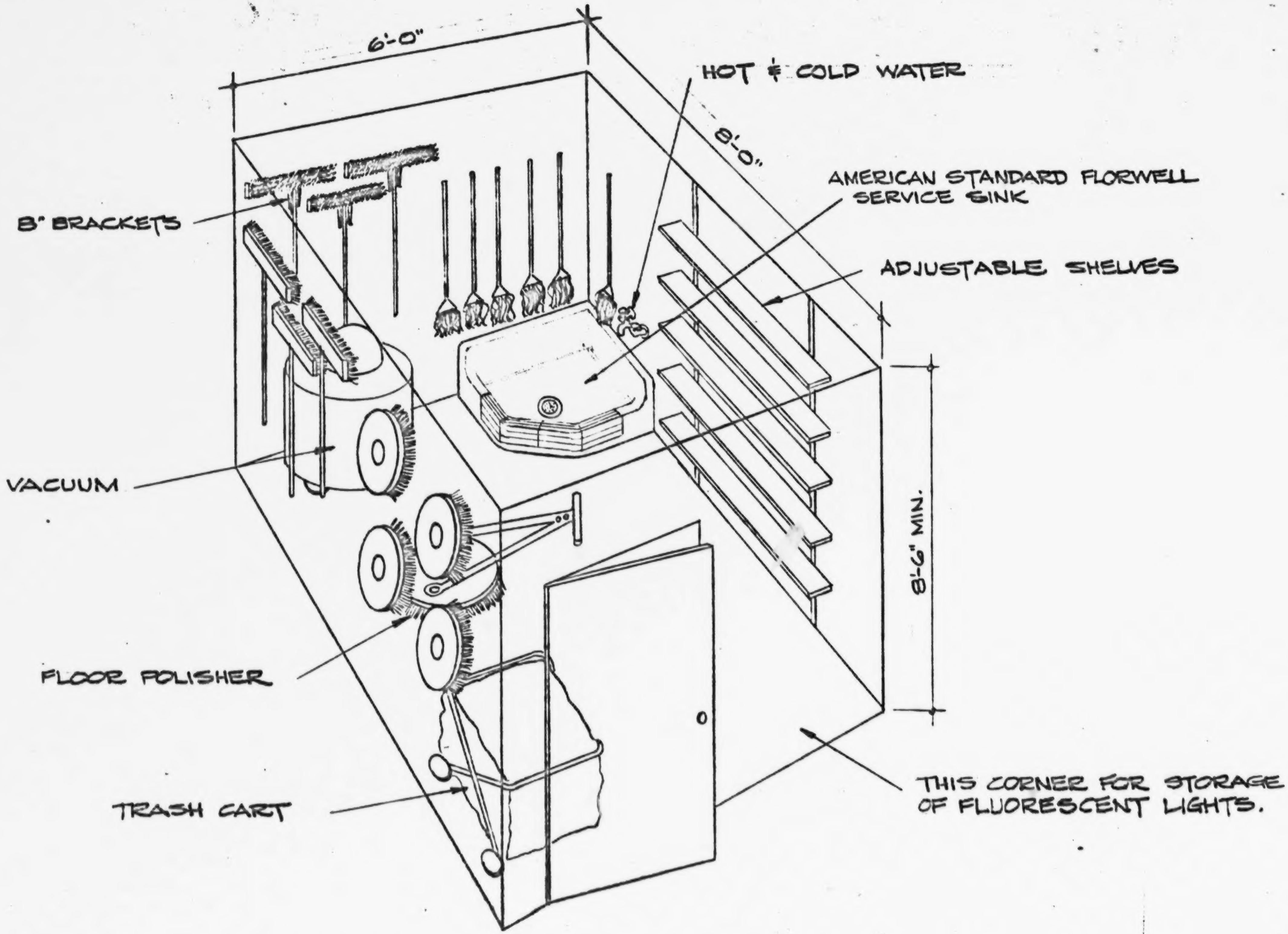
CUSTODIAL ROOMS

SECTION 1

1. Custodial work is performed by full-and part-time men and women on the Brigham Young University Campus. Custodial equipment and supply rooms shall be located frequently and conveniently on each floor in each building. There shall be at least one 6 ft. by 8 ft. custodial room for each 10,000 square feet of building floor area. Walls shall not be covered with telephone or electrical equipment. Each room shall have a slop sink with pop-up drain and a mixer type faucet. Shelving, clothes hooks, equipment hooks, etc. shall be constructed into each room for the storage of supplies and tools. (See sketch on following pate).

SECTION 2

1. A small room about 6 ft. by 8 ft. shall be provided near the service entrance of a building for the storage of tools and supplies used in the maintenance of plants within the building.


6'-0"
HOT & COLD WATER
8'-0"
AMERICAN STANDARD FLORWELL SERVICE SINK
8" BRACKETS
ADJUSTABLE SHELVES
VACUUM
8'-6" MIN.
FLOOR POLISHER
TRASH CART
THIS CORNER FOR STORAGE OF FLUORESCENT LIGHTS.

TYPICAL CUSTODIAL ROOM

BRIGHAM YOUNG UNIVERSITY NOT TO SCALE 14 FEB 68

DIVISION 18

MAILROOM

SECTION 1

1. There shall be one mailroom in each building associated with the Custodial Office where mail may be delivered and sorted into individual boxes for departments and for professors. This room shall be conveniently located from the service entrance where the mail will be delivered by truck. The number of post office boxes will vary according to the size and occupancy of each building. These post office type boxes shall be located between the mailroom and a corridor so that mail may be sorted into them from the mailroom and taken out by unlocking the individual doors from the corridor side. Boxes for Chairmen shall be twice the size of a faculty box and the box for a Director shall be four times the size of a faculty box.

SECTION 2

1. There shall be one or more mail drops in each building located near the post office type boxes. Dimensions shall be as follows:

   Letter Drop -- 1" x 12"
   Package Drop - 7" x 14"

2. In buildings where the mail load is heavy it will be necessary to install four mail drops as follows:

   Building Mail
   Campus Mail
   Mail to be Metered
   U. S. Stamped Mail

3. If more than one mail drop is needed, this will be indicated in the Program Requirements.

DIVISION 19

MATERIALS OF CONSTRUCTION

SECTION 1 - EXTERIOR WALLS

1. The exterior walls shall be brick, cast stone, or any other permanent type of material which does not require cleaning or painting. Wood is to be used sparingly as an exterior surface material. The materials selected must harmonize with materials used in other buildings on campus.

SECTION 2 - INTERIOR WALLS

1. On interior walls the use of plaster is to be avoided insofar as possible. Brick or block is recommended because it is easier to maintain. The use of supporting partitions is to be kept to a minimum. Wherever it seems advisable to use modular, movable partition walls to facilitate relocation in the future, it should be considered, but only if an unusually large number of relocations are anticipated.

SECTION 3 - FLOOR COVERINGS

1. Floor coverings which are easy to clean, durable, and quiet to walk on are most desirable. Vinyl, rubber, vinyl asbestos, asphalt tile, and concrete should be considered in that order. It is expected that still better materials will become available in the near future; if they do, serious thought should be given to their use.

SECTION 4 - CEILINGS

1. Ceilings should be easy to clean, easy to replace damaged portions, and light in color.

SECTION 5 - WINDOWS

1. Aluminum windows are preferred over wood or steel with ceramic tile or cast stone sills on the inside. Provisions shall be made for cleaning of all windows without the excessive expense of exterior scaffolding. In buildings which are air conditioned, pivot type, wrench operated windows are recommended to facilitate cleaning and to provide ventilation in case of mechanical air conditioning failure. Excessive heat transmission into the building and extreme light and glare shall be controlled by proper orientation of windows, roof overhang, adjustable louvers, etc.

2. Glass should not be used to excess either in air-conditioned buildings or in buildings that are not air-conditioned. Windows on south and west elevations shall have external sun control devices, such as sun screen or louvers.

3. All windows shall be located within easy reach for periodic cleaning inside and out or they shall be of a design which will allow easy access to both sides from the inside.

4. Skylights shall not be used in any building without specific approval from the Director of the Department of Physical Plant.

SECTION 6 - DOORS AND FRAMES

1. Outside entrance doors shall be aluminum or stainless steel with glass panels. Closers shall be located on the inside. Interior doors may be wood or metal of institutional quality. All frames shall be constructed of metal -- no wood is to be used.

SECTION 7 - FLOOR LOAD

1. Design floor loading shall be prominently recorded on working drawings.

DIVISION 20

ENTRANCE WAYS

SECTION 1

1. Major entrances shall have double doors with at least seven feet between the inner and the outer doors. Glass panels in doors or at the side of the doors must have a horizontal bar through the middle to prevent people from walking through. A step with a 2 or 3 inch riser just outside an entrance door to stop dirt and water from entering the building is to be avoided as it frequently trips people. Snow melting coils in the concrete approaches to all major outside entrances are recommended.

2. At least one wheelchair ramp shall be provided for each building. It should be located at a major entrance and reasonably convenient to parking or service drive and other campus buildings that might be nearby. This wheelchair ramp shall have a minimum width of 4 feet and shall not exceed 1 ft. of vertical riser for each 10 ft. of horizontal distance. Handrails shall be provided on each side of the ramp.

3. Door closers shall not have hold open devices except where specific approval is obtained from the Director of the Depratment of Physical Plant.

4. All entrance doors which have glass panels shall use "Misco pattern wire glass."

DIVISION 21

STAIRWAYS

SECTION 1

1. Terrazzo or any other material that wears well may be used for steps if nosings have abrasive inserts to reduce slipping. Handrails shall be of a design and shape as to prevent catching one's finger in a space of diminishing size and shall be free of sharp edges and corners. They shall be firmly anchored to the walls and steps in such a manner that they will not work loose.

DIVISION 22

DRINKING FOUNTAINS

SECTION 1

1. Drinking fountains shall be the refrigerated type. There shall be a cooling unit for each fountain with access panels for easy access and service.

DIVISION 23

LIGHTING

SECTION 1 - LIGHTING FIXTURES

1. Fluorescent fixtures which have an "A" sound rating and dissipate a minimum of heat are preferred. The standard tube length on this campus is 4 feet. Fixtures shall be rapid start type, shall have a high power factor ballast with thermal protection built in, and shall be approved by the Certified Ballast Manufacturing or the Electrical Testing Laboratory.

SECTION 2 - RECOMMENDED LIGHTING LEVELS

1. 2 to 5 ft. candles:

   a. Parking lot.
   b. Outdoor stair.

2. 10 to 30 ft. candles:

   a. Corridor.
   b. Stairway.
   c. Dressing room.
   d. Restroom.
   e. Storage room.
   f. Auditorium.
   g. Cafeteria.
   h. Custodial room.
   i. Entrance foyer.
   j. Physical therapy.
   k. Residence hall living room.

3. 30 to 70 ft. candles:

   a. Classroom.
   b. Laboratory.
   c. Conference room.
   d. Mechanical equipment room.
   e. Food preparation area.
   f. Library.
   g. Multi-purpose area.
   h. Museum.
   i. Office.
   j. Preparation room.

    - k. Shop
    - l. Art studio.
    - m. Secretarial workroom.
    - n. Residence hall kitchen and study area.

4. 70 to 100 ft. candles:

    - a. Drafting room.
    - b. Sewing room.
    - c. Exhibition Gym floor.

DIVISION 24

HEATING AND AIR CONDITIONING

SECTION 1

1. Air conditioning for each building shall be in accordance with the Program Requirements written for that building.

2. Filters shall be specified to be placed in the circulating hot water or chilled water systems during the construction period to remove foreign matter.

DIVISION 25

ROOFINGS AND FLASHINGS

SECTION 1 - SPECIFICATION

1. Use of the full coverage 20-year bond roofing specification for the type of deck upon which the roofing is being applied; Ruberoid Specification or approved equal.

SECTION 2 - GENERAL

1. Only round clamp type drains shall be used.

2. Two or more objects shall not extend through the roofing closer than 18" unless both objects are flashed with integral flashing. No objects shall extend through the roof closer than 18" from cant strips or firewalls, etc.

3. All lead pipe flashings and lead pane shall be no less than 6-pounds per square foot sheet lead. All pipe flashings for plumbing and heating shall have a minimum of 6" flange on the bases and shall extend 1" above the pipe. When work is complete the lead shall be bent down inside the pipe.

4. All lead drain pans shall be not less than 30" x 30" for roof, floor, etc.

5. The plumbing contractor shall extend drain pipes through the bowl of a drain no less than 1-1/2" above the bottom of the bowl, but in any event not to exceed 50% of the depth of the bowl.

6. On cant strips, flashings, and for a 30" square around roof drains, use 186-196° F. steep roof asphalt.

7. Raise all edges of flat roofs at least 4" and preferably 6". Slope toward drain not less than 3" per foot from gravel stop.

8. The plumber shall protect the drains by means of welded wire mesh, screens or other acceptable manner as soon as they are installed and shall not remove this protection until the roofs have been inspected and accepted.

9. The Architect should clearly designate who is to furnish each type of flashing, counter flashing, roof jack, etc.; whether they are lead, steel, copper, galvanized iron, etc.

DIVISION 26

FILLING, BACKFILLING, AND COMPACTION

SECTION 1

1. All fill and backfill shall be placed and compacted in accordance with the following conditions:

   a. This section applies to any and all backfill, whether it be utility trenches, roadways, structures or any other condition. The Contractor may use material excavated from the site provided the following conditions can be met for this material. If more material is needed for filling and backfilling than can be obtained from the site, then the Contractor, at his expense, shall obtain same from a source from off the Campus.

   b. Fill and backfill shall not be placed against any wall, footing, etc., that might cause damage to said wall, footing, etc. Fill and backfill shall only be placed where walls or other facilities are adequately supported, braced, and otherwise protected from damage due to the filling and backfilling process.

   c. All fill material shall be compacted to a density of 90% as determined by the Modified AASHO Test except fill beneath footings or foundations, or other structures, which shall be compacted to 95% of the Modified AASHO.

   d. Optimum moisture content shall be maintained at all times. If the material is too dry, then water shall be added until the optimum moisture content is reached. If the material is too wet, then it shall be mixed and blended with dry material until the optimum moisture content is reached.

   e. All fill shall be placed in uniform layers not to exceed 6" in depth prior to compacting, and compacted to the required density before the next layer of material is placed.

   f. If the material on the site cannot be compacted to the required density, the Contractor shall obtain material from off the Campus at his expense so that the required density can be obtained.

   g. Beneath all sidewalks, curbs, and gutter exterior concrete slabs, and blacktop areas, the earth shall be compacted to 90% of the Modified AASHO for at least 12" below any gravel or sub-base material before the placement of gravel or other base material. This compaction may be accomplished by any method of mechanical compaction that will give the required density.

h. All piping not encased in concrete shall be bedded in sand, without rocks or other foreign material, at least 2" thick. Sand shall be placed all around the pipe for the full width of the trench and shall extend at least 6" above the top of the pipe. One hundred per cent of this sand shall pass a 3/4" screen. Ninety-five per cent shall pass a No. 4 screen, and not over eight per cent shall pass a No. 100 screen. The sand shall be compacted by the use of water and vibratory compactors. Excess water shall not be used where this would result in any damage due to flooding. The remainder of the trench shall be compacted as specified above.

i. If there is not enough fill on the site, and if this fill is not acceptable, then the contractor shall, at his own expense, provide fill from other sources other than the Campus to bring the fill and backfill to the required grades as called for by the plans and specifications.

j. The Contractor will be required to use any conventional or standard method for compacting so long as the required density is obtained and no damage occurs or will ensue to the structure.

SECTION 2 - DISPOSAL OF SURPLUS MATERIAL

1. Surplus excavated material may be used for filling and backfilling in accordance with the section entitled "Filling, Backfilling, and Compaction." All excess material not used in the filling and backfilling process shall be hauled from the site. The Contractor will be required to dispose of all unused, excavated material and it becomes his responsibility to determine the most economical way to arrange for its disposal.

2. If the Contractor hauls away more excavated material from the site than will be required for filling and backfilling, it will be his responsibility to furnish additional fill to bring the finish grades up to the finished levels as required by the plans and specifications.

3. The Owner reserves the right to use any excess material which will not be required for filling and backfilling without any additional expense to the Owner. If so indicated in writing, the Contractor shall deposit this excess material on the Campus where directed.

DIVISION 27

ELEVATORS AND DUMBWAITERS

SECTION 1 - ELEVATORS

1. The Architect shall include the following statement in the elevator section of the specifications: Complete shop drawings along with all other drawings and specifications required to adequately describe the proposed elevator shall be submitted to the Owner through the General Contractor and the Architect in accordance with Section 7 of the General Conditions. Written approval of the Owner shall be obtained before fabrication and installation of the elevator may begin. Failure to comply with these instructions will constitute a breech of contract.

2. All floors in elevator machine rooms are to be of concrete with a sweat trowel finish. All steel beams, anchor bolts, etc. embedded in the concrete but exposed above the floor shall be finished off in a workmanlike manner.

3. All floors shall be cleaned of all debris, mortar, etc.

4. Elevator hoistways constructed of masonry shall have a struck joint. Elevator hoistways constructed of concrete shall have a smooth surface obtainable with plywood or steel forms in good condition.

5. All elevator access pits (below grade) shall be constructed of concrete with a concrete floor. Floor surface is to be sweat trowel finished and shall be cleaned of all debris, mortar, etc.

6. All machine room floors and access pit floors shall be painted, using #70922 Tile Red "Treasure Tone" or #352 Tile Red "Dutch Boy" paint.

7. All elevator access pits (below grade) shall be waterproofed.

8. Elevators shall have controls on top of the car so that servicemen will be able to control the elevator from the top of the car, completely and exclusively.

9. Specifications shall be written for each elevator according to the use and need of each particular elevator.

10. The elevator contractor shall provide a maintenance service for all elevators for a period of 90 days after the building has been turned over to the Owner by the General Contractor.

11. The elevator contractor shall guarantee that the materials and workmanship of the apparatus installed by him shall be first class in every respect; and that he will make good any defects, not due to ordinary wear and tear or improper use, which may develop within one year from the date of completion of the installation.

12. All elevator installations shall conform with "American Standard Safety Code for Elevators," latest edition. Copies of this code may be obtained by writing to American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N. Y., 10017.

SECTION 2 - DUMBWAITERS

1. The Architect shall include the following statement in the dumbwaiter section of the specifications: Complete shop drawings along with all other drawings and specifications required to adequately describe the proposed dumbwaiter shall be submitted to the Owner through the General Contractor and the Architect in accordance with Section 7 of the General Conditions. Written approval of the Owner shall be obtained before fabrication and installation of the dumbwaiter may begin. Failure to comply with these instructions will constitute a breech of contract.

2. All floors in dumbwaiter machine rooms are to be of concrete with a sweat trowel finish. All steel beams, anchor bolts, etc. embedded in the concrete, but exposed above the floor, shall be finished off in a workmanlike manner.

3. All floors shall be cleaned of all debris, mortar, etc.

4. Dumbwaiter hoistways constructed of masonry shall have a struck joint. Dumbwaiter hoistways constructed of concrete shall have a smooth, surface obtainable with plywood or steel forms in good condition.

5. All dumbwaiter access pits (below grade) shall be constructed of concrete with a concrete floor. Floor surface is to be sweat trowel finished and shall be cleaned of all debris, mortar, etc.

6. All machine room floors and access pit floors shall be painted, using #70922 Tile Red "Treasure Tone" or #352 Tile Red "Dutch Boy" paint.

7. Where driving machines are located at the bottom of dumbwaiter hoistways, a keyed access door must be provided at the bottom of the hoistway for access to the machine.

8. All dumbwaiters should be power operated.

9. Specifications shall be written for each dumbwaiter to suit the particular application.

10. The dumbwaiter contractor shall provide a maintenance service for all dumbwaiters for a period of 90 days after the building has been turned over to the Owner by the General Contractor.

11. The dumbwaiter contractor shall guarantee that the materials and workmanship of the apparatus installed by him shall be first class in every respect; and that he will make good any defects, not due to ordinary wear and tear or improper use, which may develop within one year from the date of completion of the installation.

12. All dumbwaiter installations shall conform with the "American Standard Safety Code for Elevators," latest edition. Copies of this code may be obtained by writing to American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N. Y., 10017.

DIVISION 28

FACILITIES FOR THE PHYSICALLY HANDICAPPED

SECTION 1

1. It is the intention of the University to construct and equip all buildings to accommodate the physically handicapped person. For detailed information the Architect and his Engineers are referred to a publication entitled, Making Facilities Accessible to the Physically Handicapped," obtainable from State University Construction Fund, Albany, New York.